LAMONT-DOHERTY GEOLOGICAL OBSERVATORY

OF COLUMBIA UNIVERSITY

PALISADES, NEW YORK

Results of IPOD Site Surveys Aboard R/V VEMA Cruise 3207

PART A: DATA REPORT

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Technical Report No. CU-2-75

International Phase of Ocean Drilling Grant 25905

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Preface

The International Phase of Ocean Drilling (IPOD) sponsored by the National Science Foundation is the fourth phase of the Deep-Sea Drilling Project. The IPOD site survey management is situated at Lamont-Doherty Geological Observatory of Columbia University under the general supervision of Dr. Marcus Langseth. The site surveying was done under a sub-contract from Scripps Institute of Oceanography (International Phase of Ocean Drilling Grant 25905 of the National Science Foundation Grant UC-NSF-842-2).

We wish to thank the officers crew and scientific staff aboard R/V VEMA for their cooperation in gathering the data. In particular, the shipboard participation of Dr. G. Michael Purdy of Woods Hole Oceanographic Institution was greatly appreciated.

SHIPBOARD PARTICIPANTS

VEMA 3207
Barbados to San Juan

CREW

Kohler, Henry C.	Master
Cunningham, Peter	Chief Officer
Schnare, Thomas	2nd Officer
Johnson, Robert	Radio Officer
Williams, A.	A.B.
Sergent, B.	A.B.
Walker, Thomas	O.S.
Nicholson, Allan	O.S.
Himmelman, Eric	O.S.
Griswold, William	Bosun
Coffill, John	Chief Engineer
Pentz, Clarence	2nd Engineer
Knickle, Clyde	3rd Engineer
Murphy, Alphonse	Oiler
Hull, Joseph	Chief Steward
Edwards, George	Messman
Creaser, Thomas	Messman

SCIENTISTS

Rabinowitz, Philip	Chief Scientist
Aitken, Thomas	Asst. Chief Scientist
Antle, Michael	Airgun
Bitte, Ivars	Sr. Engineer
Boehner, Martin	Coring O.S.
Bogart, Richard	Camera
Brock, Robert	E.T.
Brown, Walter	Computer Tech.
Gunther, George	OBS Tech.
Gutierrez, Carlos	E.T.
Holland, David	E.T.
Knickle, Lloyd	Coring Bosun
Paisley-Smith, Van	Gravity
Pratt, David	Core Describer
Purdy, Michael	Scientific O.S. (WHOI)
Zielinski, Gary	T' grad

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Introduction

The purpose of this report is to present the underway geophysical measurements (navigation, bathymetric, gravimetric, geomagnetic, seismic reflection and sonobuoy refraction) as well as the station data (coring, heat flow, bottom photography and nephelometer) collected aboard R/V VEMA during cruise 3207. The cruise was devoted to surveying two sites (Sites 3 and 4) for the International Phase of Ocean Drilling (IPOD) program. Site 4 is situated in the region of magnetic anomaly 13 (∿38 m.y.b.p.) west of the mid-Atlantic ridge axis in the central North Atlantic Ocean. An approximate 1° box grid was surveyed and two longer lines obtained in order to a) recognize the magnetic lineation pattern in this region and b) aid in the selection of the optimum location of the drill hole.

Site 3 is situated in the region of the oldest magnetic anomalies seaward of the Cretaceous quiet zone in the central western North Atlantic (anomalies 31 to 34; 75 to ∿81 m.y.b.p.). Site 3 was chosen to lie along the same synthetic flow line and same age but on the opposite side of the ridge axis as Site 7 (surveyed aboard R/V VEMA cruise 3206).

One ocean-bottom seismograph experiment was performed in Site 4. The result of this experiment as well as the interpretation of the data obtained on Sites 3 and 4 will be presented in forthcoming reports.

Instrumentation

The Navy satellite navigation system (Guier, 1966) was used to obtain frequent and precise fixes. The ship's electromagnetic (E-M) log and gyrocompass were used to interpolate the ship's track between satellite fixes by employing the computer techniques of Talwani (1969). These interpolated ship positions should be generally accurate to better than 0.5 nautical mile.

Both 12 kHz and 3.5 kHz transducers were used with a redesigned Westrex Mark V recorder for the precision depth measurements. Relative depths can be resolved to about 1 fathom (1/400 sec of reflection time) in any depth in regions of low to moderate relief. Side echoes are common in areas of high relief and the resolution of small amplitude relief is extremely difficult in such areas.

A Graf-Askania seagravimeter (Gss2 #12) mounted on an Aeroflex gyro-stabilized platform was used for all gravity measurements. This system and associated analogue cross-coupling correction devices are described by Talwani (1970), and by Talwani et al. (1966). The absolute accuracy of the system under normal sea conditions in the open ocean is estimated at about ± 3 mgal. The relative accuracy of measurements along tracks with constant heading and steady sea-state conditions is somewhat better.

A Varian proton precession magnetometer was used for all magnetic measurements. The instrument was towed approximately 500 ft. astern of the ship. The accuracy of this type of instrument has been discussed in many publications (e.g. Heirtzler, 1961; Bullard and Mason, 1963) and is generally accepted to be ± 10-15 gammas.

The sound source of the seismic profiling system is a free-firing (410 cm^3) airgun with a repetition rate of about 12 sec at 140 bars air pressure (Ewing and Zaunere, 1964). The signal is received by a towed hydrophone array, pre-amplified and fed into a two-channel drum recorder (Ewing and Tirey, 1961). The signal is recorded as variable-density profiles. The sonobuoy records, recorded on the same drum as the seismic profiler records, were obtained with the airgun as a sound source and towed away from the sonobuoy (SSQ41 model) at a speed of $\sim$6 knots.

The heat flow measurements were obtained with the Ewing thermograd mounted on a piston corer. For a complete description of the instruments and techniques used to measure temperature and conductivity in the deep sea, the reader is referred to Gerard et al. (1960) and Langseth (1965).

The Ewing-Thorndike deep-sea camera used on this cruise was similar to that described by Thorndike (1959). The nephelometer is similar to that described by Thorndike and Ewing (1967).

SECTION 1

UNDERWAY GEOPHYSICAL DATA

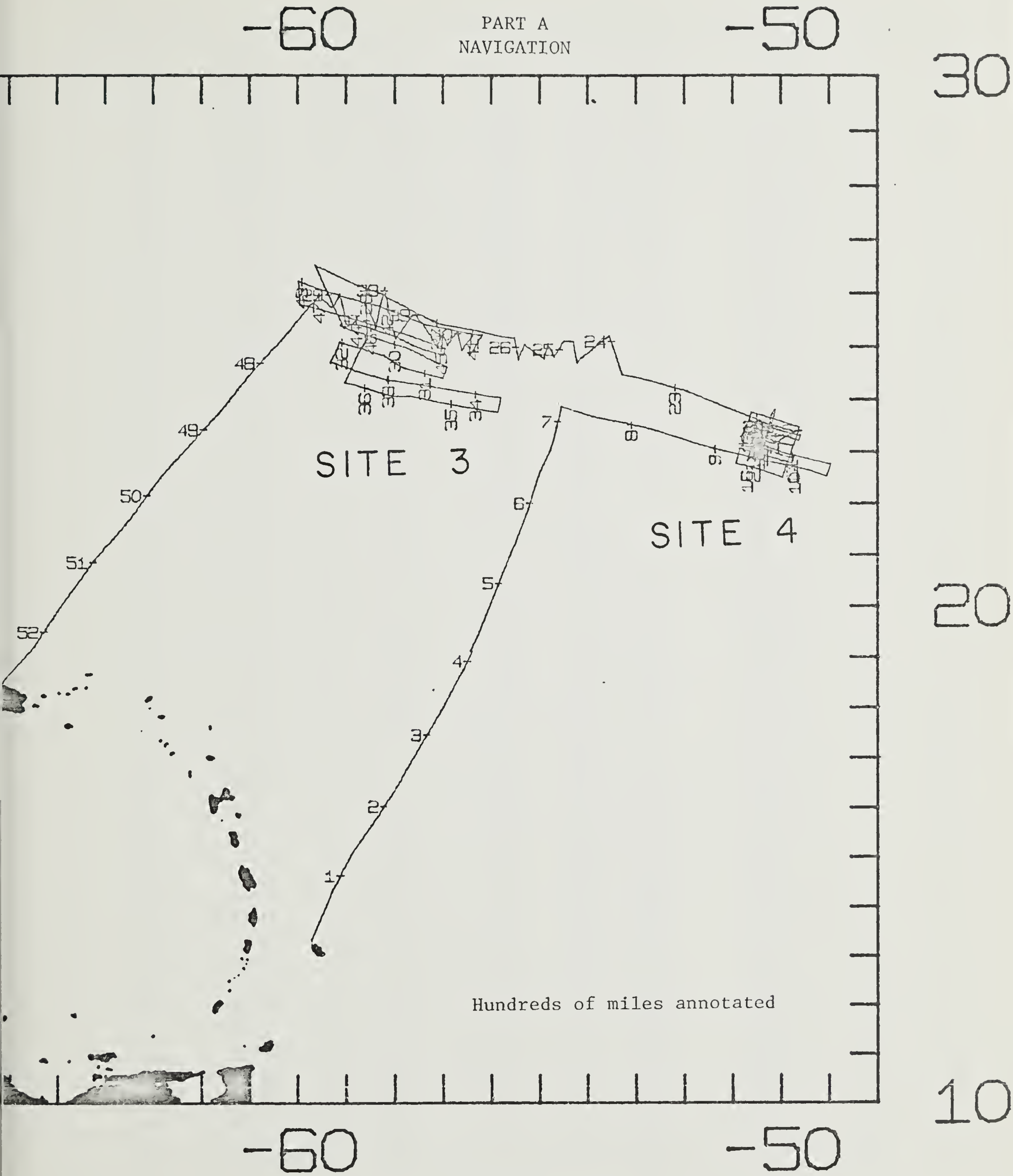
PART A: Navigation

PART B: Bathymetric, geomagnetic and gravity profiles

PART C: Seismic Reflection Records

PART D: Sonobuoy Results

PART A
NAVIGATION



DAY	MON	YEAR	TZ	TIME	LATITUDE		LONGITUDE		DISTANCE	SPEED	COURSE
23	3	1975	4.0	947	13	6.2	-59	40.0	0.0	5.9	331
23	3	1975	4.0	1021	13	9.1	-59	41.7	3.3	10.0	330
23	3	1975	4.0	1030	13	10.4	-59	42.4	4.8	7.7	0
23	3	1975	4.0	1140	13	19.4	-59	42.4	13.8	7.5	355
23	3	1975	4.0	1151	13	20.8	-59	42.5	15.2	8.1	26
23	3	1975	4.0	1156	13	21.4	-59	42.2	15.9	7.6	25
23	3	1975	4.0	1326	13	31.7	-59	37.2	27.3	7.2	22
23	3	1975	4.0	15 0	13	42.1	-59	32.9	38.5	7.3	22
23	3	1975	4.0	1624	13	51.5	-59	28.9	48.7	7.5	25
23	3	1975	4.0	18 0	14	2.5	-59	23.7	60.8	6.9	24
23	3	1975	4.0	18 8	14	3.3	-59	23.3	61.7	7.4	22
23	3	1975	4.0	20 0	14	16.2	-59	18.1	75.6	7.8	24
23	3	1975	4.0	2020	14	18.6	-59	17.0	78.2	7.3	27
23	3	1975	4.0	2044	14	21.2	-59	15.6	81.1	7.1	26
23	3	1975	4.0	2136	14	26.7	-59	12.9	87.2	6.5	32
23	3	1975	4.0	2211	14	30.0	-59	10.8	91.0	2.5	31
23	3	1975	4.0	2222	14	30.4	-59	10.5	91.5	6.6	32
23	3	1975	4.0	2232	14	31.3	-59	9.9	92.6	7.0	27
23	3	1975	4.0	2322	14	36.5	-59	7.2	98.5	7.1	23
24	3	1975	4.0	050	14	46.1	-59	3.0	108.8	7.4	29
24	3	1975	4.0	1 0	14	47.1	-59	2.4	110.0	7.5	29
24	3	1975	4.0	234	14	57.4	-58	56.6	121.7	7.5	28
24	3	1975	4.0	325	15	3.0	-58	53.5	128.1	7.6	33
24	3	1975	4.0	6 0	15	19.4	-58	42.5	147.7	1.1	237
24	3	1975	4.0	6 1	15	19.4	-58	42.5	147.7	7.7	33
24	3	1975	4.0	616	15	21.1	-58	41.4	149.6	7.6	35
24	3	1975	4.0	832	15	35.3	-58	31.2	166.9	7.7	37
24	3	1975	4.0	9 0	15	38.1	-58	29.0	170.5	2.9	40
24	3	1975	4.0	918	15	38.8	-58	28.4	171.4	3.6	34
24	3	1975	4.0	928	15	39.3	-58	28.1	172.0	0.5	234
24	3	1975	4.0	1018	15	39.1	-58	28.4	172.3	0.1	63
24	3	1975	4.0	11 6	15	39.1	-58	28.3	172.4	0.3	261
24	3	1975	4.0	1232	15	39.1	-58	28.7	172.8	0.6	198
24	3	1975	4.0	1240	15	39.0	-58	28.8	172.8	3.8	38
24	3	1975	4.0	1251	15	39.5	-58	28.3	173.5	8.6	36
24	3	1975	4.0	1416	15	49.4	-58	20.8	185.7	8.9	32
24	3	1975	4.0	1534	15	59.2	-58	14.4	197.3	8.9	32
24	3	1975	4.0	16 0	16	2.5	-58	12.3	201.2	8.8	32
24	3	1975	4.0	1720	16	12.4	-58	5.9	212.9	8.5	32
24	3	1975	4.0	19 0	16	24.5	-57	58.1	227.1	8.1	32
24	3	1975	4.0	1912	16	25.8	-57	57.2	228.7	8.8	32
24	3	1975	4.0	1954	16	31.1	-57	53.8	234.9	9.0	29
24	3	1975	4.0	2058	16	39.5	-57	48.9	244.5	8.7	28
24	3	1975	4.0	2142	16	45.1	-57	45.8	250.9	8.8	31
24	3	1975	4.0	22 0	16	47.4	-57	44.4	253.5	9.3	31
24	3	1975	4.0	2230	16	51.4	-57	41.9	258.1	8.7	30
24	3	1975	4.0	2354	17	1.9	-57	35.6	270.3	8.9	30
25	3	1975	4.0	0 0	17	2.7	-57	35.2	271.2	8.8	30
25	3	1975	4.0	140	17	15.4	-57	27.5	285.9	8.7	32
25	3	1975	4.0	3 0	17	25.4	-57	21.1	297.5	8.9	32

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
25	3	1975	4.0	322	17 28.1	-57 19.3	300.8	8.7	30
25	3	1975	4.0	5 8	17 41.4	-57 11.2	316.1	8.5	31
25	3	1975	4.0	6 0	17 47.8	-57 7.3	323.5	8.5	31
25	3	1975	4.0	630	17 51.4	-57 5.0	327.8	8.5	32
25	3	1975	4.0	7 0	17 55.0	-57 2.6	332.0	8.6	26
25	3	1975	4.0	712	17 56.6	-57 1.8	333.8	8.4	29
25	3	1975	4.0	744	18 0.5	-56 59.5	338.3	8.6	27
25	3	1975	4.0	816	18 4.6	-56 57.4	342.8	8.7	29
25	3	1975	4.0	930	18 14.0	-56 51.9	353.5	8.7	25
25	3	1975	4.0	10 0	18 17.9	-56 50.0	357.9	8.4	25
25	3	1975	4.0	1014	18 19.7	-56 49.1	359.9	9.1	27
25	3	1975	4.0	1136	18 30.8	-56 43.1	372.3	8.9	29
25	3	1975	4.0	13 0	18 41.7	-56 36.7	384.8	8.9	29
25	3	1975	4.0	1324	18 44.8	-56 34.8	388.4	9.0	25
25	3	1975	4.0	16 0	19 6.1	-56 24.3	411.9	3.8	18
25	3	1975	4.0	1614	19 7.0	-56 24.1	412.8	0.8	291
25	3	1975	4.0	1632	19 7.1	-56 24.3	413.0	0.6	304
25	3	1975	4.0	18 8	19 7.6	-56 25.1	414.0	1.0	298
25	3	1975	4.0	1836	19 7.8	-56 25.5	414.4	0.8	347
25	3	1975	4.0	1850	19 8.0	-56 25.6	414.6	5.4	24
25	3	1975	4.0	19 0	19 8.8	-56 25.2	415.5	9.1	27
25	3	1975	4.0	1952	19 15.9	-56 21.5	423.4	8.9	26
25	3	1975	4.0	2054	19 24.1	-56 17.2	432.6	7.9	29
25	3	1975	4.0	21 0	19 24.8	-56 16.8	433.4	9.1	23
25	3	1975	4.0	2136	19 29.8	-56 14.5	438.9	8.8	19
25	3	1975	4.0	2256	19 40.9	-56 10.3	450.6	8.4	26
25	3	1975	4.0	2326	19 44.7	-56 8.3	454.8	8.5	22
26	3	1975	4.0	0 0	19 49.2	-56 6.4	459.6	8.2	22
26	3	1975	4.0	3 0	20 11.9	-55 56.8	484.1	8.3	22
26	3	1975	4.0	422	20 22.4	-55 52.3	495.4	7.9	26
26	3	1975	4.0	436	20 24.1	-55 51.5	497.3	8.5	20
26	3	1975	4.0	6 0	20 35.2	-55 47.1	509.1	8.5	20
26	3	1975	4.0	626	20 38.6	-55 45.8	512.8	8.7	22
26	3	1975	4.0	710	20 44.5	-55 43.2	519.1	8.6	22
26	3	1975	4.0	842	20 56.8	-55 38.0	532.4	8.6	25
26	3	1975	4.0	9 0	20 59.1	-55 36.8	534.9	8.5	25
26	3	1975	4.0	924	21 2.2	-55 35.3	538.3	8.7	24
26	3	1975	4.0	1028	21 10.7	-55 31.2	547.6	8.6	22
26	3	1975	4.0	1112	21 16.5	-55 28.7	553.9	8.7	20
26	3	1975	4.0	12 0	21 23.0	-55 26.1	560.9	8.7	20
26	3	1975	4.0	15 0	21 47.4	-55 16.3	586.8	8.9	21
26	3	1975	4.0	1544	21 53.5	-55 13.8	593.4	8.7	16
26	3	1975	4.0	1728	22 7.9	-55 9.2	608.4	9.3	18
26	3	1975	4.0	18 0	22 12.7	-55 7.6	613.4	9.3	18
26	3	1975	4.0	1850	22 20.0	-55 5.0	621.1	8.3	19
26	3	1975	4.0	1932	22 25.5	-55 3.0	626.9	9.1	16
26	3	1975	4.0	20 4	22 30.2	-55 1.6	631.8	8.2	23
26	3	1975	4.0	21 0	22 37.2	-54 58.4	639.4	8.8	23
26	3	1975	4.0	2152	22 44.2	-54 55.1	647.0	8.6	26
26	3	1975	4.0	2234	22 49.7	-54 52.3	653.1	8.8	26

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
26	3	1975	4.0	2348	22 59.4	-54 47.2	663.9	8.9	27
27	3	1975	4.0	0 0	23 1.0	-54 46.3	665.6	8.9	18
27	3	1975	4.0	134	23 14.3	-54 41.6	679.6	9.0	14
27	3	1975	4.0	3 0	23 26.8	-54 38.3	692.6	8.6	14
27	3	1975	4.0	518	23 46.1	-54 33.2	712.4	9.6	6
27	3	1975	4.0	551	23 51.4	-54 32.6	717.7	8.2	108
27	3	1975	4.0	746	23 46.7	-54 16.2	733.4	8.4	107
27	3	1975	4.0	830	23 44.9	-54 9.7	739.6	7.7	107
27	3	1975	4.0	942	23 42.2	-54 0.1	748.8	7.5	109
27	3	1975	4.0	1022	23 40.6	-53 54.9	753.8	8.1	105
27	3	1975	4.0	1130	23 38.2	-53 45.2	763.0	8.4	105
27	3	1975	4.0	1134	23 38.1	-53 44.6	763.6	8.7	101
27	3	1975	4.0	12 6	23 37.2	-53 39.7	768.2	8.8	105
27	3	1975	4.0	1215	23 36.9	-53 38.3	769.5	8.6	102
27	3	1975	4.0	1320	23 34.9	-53 28.4	778.8	8.7	101
27	3	1975	4.0	1452	23 32.3	-53 14.1	792.2	8.6	101
27	3	1975	4.0	1520	23 31.5	-53 9.8	796.2	8.2	104
27	3	1975	4.0	1640	23 28.9	-52 58.1	807.2	8.3	101
27	3	1975	4.0	1740	23 27.2	-52 49.2	815.5	8.6	102
27	3	1975	4.0	18 6	23 26.4	-52 45.3	819.3	8.0	108
27	3	1975	4.0	1842	23 25.0	-52 40.3	824.1	8.8	107
27	3	1975	4.0	19 0	23 24.2	-52 37.5	826.7	0.5	56
27	3	1975	4.0	19 1	23 24.2	-52 37.5	826.7	9.2	107
27	3	1975	4.0	1914	23 23.7	-52 35.4	828.7	8.5	108
27	3	1975	4.0	1928	23 23.0	-52 33.3	830.7	8.4	108
27	3	1975	4.0	21 4	23 19.0	-52 19.4	844.2	8.9	106
27	3	1975	4.0	2140	23 17.5	-52 13.8	849.5	8.6	107
27	3	1975	4.0	22 0	23 16.7	-52 10.8	852.4	8.9	107
27	3	1975	4.0	2326	23 13.0	-51 57.5	865.1	8.6	110
28	3	1975	4.0	0 0	23 11.3	-51 52.5	870.0	8.9	110
28	3	1975	4.0	040	23 9.3	-51 46.4	876.0	8.7	105
28	3	1975	4.0	244	23 4.7	-51 27.6	893.9	8.5	109
28	3	1975	4.0	3 0	23 4.0	-51 25.3	896.1	8.9	109
28	3	1975	4.0	320	23 3.0	-51 22.3	899.1	8.7	102
28	3	1975	4.0	4 0	23 1.8	-51 16.1	904.9	8.7	102
28	3	1975	4.0	432	23 0.9	-51 11.2	909.5	8.6	106
28	3	1975	4.0	446	23 0.3	-51 9.1	911.5	8.8	102
28	3	1975	4.0	634	22 56.9	-50 52.3	927.3	9.0	104
28	3	1975	4.0	7 0	22 56.0	-50 48.2	931.2	9.0	104
28	3	1975	4.0	7 6	22 55.8	-50 47.3	932.1	8.5	106
28	3	1975	4.0	813	22 53.1	-50 37.4	941.6	8.4	110
28	3	1975	4.0	824	22 52.6	-50 35.8	943.1	8.3	108
28	3	1975	4.0	852	22 51.4	-50 31.9	947.0	9.9	104
28	3	1975	4.0	9 0	22 51.1	-50 30.5	948.3	5.4	286
28	3	1975	4.0	915	22 51.4	-50 31.9	949.7	0.2	76
28	3	1975	4.0	930	22 51.4	-50 31.8	949.7	0.4	256
28	3	1975	4.0	1038	22 51.3	-50 32.2	950.1	0.3	286
28	3	1975	4.0	1226	22 51.5	-50 32.8	950.6	0.6	277
28	3	1975	4.0	1341	22 51.6	-50 33.6	951.4	4.8	353
28	3	1975	4.0	1350	22 52.3	-50 33.7	952.1	9.0	103

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
28	3	1975	4.0	16 6	22 47.5	-50 12.1	972.6	8.9	101
28	3	1975	4.0	1630	22 46.8	-50 8.3	976.1	8.7	101
28	3	1975	4.0	1754	22 44.5	-49 55.3	988.4	9.0	102
28	3	1975	4.0	1820	22 43.6	-49 51.1	992.3	8.9	103
28	3	1975	4.0	1930	22 41.3	-49 40.2	1002.6	8.9	103
28	3	1975	4.0	20 2	22 40.2	-49 35.2	1007.4	9.1	103
28	3	1975	4.0	2048	22 38.7	-49 27.8	1014.4	9.0	101
28	3	1975	4.0	21 5	22 38.2	-49 25.1	1016.9	8.9	109
28	3	1975	4.0	22 0	22 35.5	-49 16.7	1025.0	8.7	109
28	3	1975	4.0	2234	22 33.9	-49 11.7	1030.0	9.5	109
28	3	1975	4.0	2330	22 31.1	-49 2.6	1038.8	10.2	15
28	3	1975	4.0	2344	22 33.4	-49 1.9	1041.2	10.1	17
29	3	1975	4.0	1 0	22 45.6	-48 57.8	1054.0	9.4	285
29	3	1975	4.0	154	22 47.8	-49 6.6	1062.5	8.9	284
29	3	1975	4.0	358	22 52.3	-49 25.9	1080.8	9.3	283
29	3	1975	4.0	4 0	22 52.4	-49 26.2	1081.1	8.9	283
29	3	1975	4.0	542	22 55.9	-49 42.2	1096.3	8.9	283
29	3	1975	4.0	610	22 56.8	-49 46.6	1100.4	8.8	286
29	3	1975	4.0	718	22 59.6	-49 57.1	1110.4	8.7	289
29	3	1975	4.0	8 2	23 1.7	-50 3.6	1116.8	8.7	290
29	3	1975	4.0	836	23 3.3	-50 8.7	1121.7	8.5	290
29	3	1975	4.0	9 0	23 4.5	-50 12.1	1125.1	8.4	290
29	3	1975	4.0	948	23 6.8	-50 19.0	1131.8	8.8	292
29	3	1975	4.0	1024	23 8.8	-50 24.3	1137.1	8.8	287
29	3	1975	4.0	1037	23 9.4	-50 26.2	1139.0	6.0	109
29	3	1975	4.0	1049	23 9.0	-50 25.0	1140.2	9.5	109
29	3	1975	4.0	1057	23 8.6	-50 23.7	1141.4	0.5	126
29	3	1975	4.0	1130	23 8.4	-50 23.5	1141.7	1.0	128
29	3	1975	4.0	14 7	23 6.9	-50 21.3	1144.2	5.3	172
29	3	1975	4.0	1420	23 5.8	-50 21.1	1145.4	8.1	282
29	3	1975	4.0	1648	23 10.0	-50 42.3	1165.3	10.1	279
29	3	1975	4.0	17 4	23 10.4	-50 45.2	1168.0	9.2	278
29	3	1975	4.0	1713	23 10.6	-50 46.7	1169.4	8.0	16
29	3	1975	4.0	1830	23 20.5	-50 43.7	1179.7	9.6	114
29	3	1975	4.0	1856	23 18.8	-50 39.5	1183.8	9.2	111
29	3	1975	4.0	1922	23 17.4	-50 35.5	1187.8	8.9	111
29	3	1975	4.0	21 0	23 12.2	-50 20.6	1202.4	9.0	111
29	3	1975	4.0	2110	23 11.7	-50 19.1	1203.9	8.7	109
29	3	1975	4.0	2144	23 10.1	-50 14.0	1208.8	9.0	107
29	3	1975	4.0	22 0	23 9.4	-50 11.5	1211.2	9.1	94
29	3	1975	4.0	2248	23 8.8	-50 3.6	1218.5	8.8	95
29	3	1975	4.0	2330	23 8.3	-49 56.9	1224.7	8.9	97
30	3	1975	4.0	0 0	23 7.7	-49 52.1	1229.1	9.0	97
30	3	1975	4.0	036	23 7.1	-49 46.3	1234.5	10.6	97
30	3	1975	4.0	040	23 7.0	-49 45.6	1235.2	8.4	286
30	3	1975	4.0	330	23 13.6	-50 10.5	1259.1	8.5	286
30	3	1975	4.0	440	23 16.3	-50 20.9	1269.0	8.5	285
30	3	1975	4.0	530	23 18.2	-50 28.3	1276.1	8.5	290
30	3	1975	4.0	610	23 20.1	-50 34.1	1281.7	8.3	291
30	3	1975	4.0	640	23 21.6	-50 38.3	1285.9	9.5	291

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
30	3	1975	4.0	722	23 24.0	-50 45.1	1292.5	8.6	15
30	3	1975	4.0	8 0	23 29.2	-50 43.6	1298.0	9.5	105
30	3	1975	4.0	9 0	23 26.8	-50 33.6	1307.5	9.2	105
30	3	1975	4.0	932	23 25.5	-50 28.4	1312.4	8.8	107
30	3	1975	4.0	1034	23 22.9	-50 18.9	1321.6	8.7	106
30	3	1975	4.0	11 0	23 21.8	-50 14.9	1325.3	8.6	106
30	3	1975	4.0	1118	23 21.1	-50 12.2	1327.9	8.9	104
30	3	1975	4.0	1220	23 19.0	-50 2.5	1337.1	9.0	106
30	3	1975	4.0	14 0	23 14.9	-49 46.7	1352.2	9.0	106
30	3	1975	4.0	1414	23 14.3	-49 44.5	1354.3	9.8	108
30	3	1975	4.0	1455	23 12.3	-49 37.6	1360.9	8.3	17
30	3	1975	4.0	1542	23 18.5	-49 35.5	1367.4	9.1	283
30	3	1975	4.0	16 0	23 19.1	-49 38.4	1370.2	8.4	285
30	3	1975	4.0	1750	23 23.0	-49 54.7	1385.7	8.5	286
30	3	1975	4.0	1830	23 24.6	-50 0.6	1391.3	8.4	286
30	3	1975	4.0	1936	23 27.0	-50 10.3	1400.5	8.4	283
30	3	1975	4.0	20 2	23 27.9	-50 14.1	1404.2	8.5	290
30	3	1975	4.0	2050	23 30.1	-50 21.1	1410.9	8.2	290
30	3	1975	4.0	22 6	23 33.6	-50 31.7	1421.3	8.3	290
30	3	1975	4.0	2238	23 35.1	-50 36.3	1425.7	8.9	287
30	3	1975	4.0	23 0	23 36.1	-50 39.7	1429.0	8.0	19
30	3	1975	4.0	2340	23 41.1	-50 37.8	1434.3	8.8	16
31	3	1975	4.0	0 7	23 44.9	-50 36.6	1438.3	9.2	106
31	3	1975	4.0	126	23 41.6	-50 23.8	1450.4	8.9	109
31	3	1975	4.0	2 6	23 39.6	-50 17.7	1456.4	9.0	109
31	3	1975	4.0	3 0	23 37.1	-50 9.3	1464.4	9.0	109
31	3	1975	4.0	352	23 34.6	-50 1.3	1472.2	9.2	108
31	3	1975	4.0	5 0	23 31.4	-49 50.4	1482.7	9.1	108
31	3	1975	4.0	5 2	23 31.3	-49 50.1	1483.0	8.8	107
31	3	1975	4.0	552	23 29.1	-49 42.5	1490.3	9.6	103
31	3	1975	4.0	625	23 27.9	-49 36.9	1495.6	9.5	196
31	3	1975	4.0	650	23 24.1	-49 38.1	1499.6	9.2	197
31	3	1975	4.0	814	23 11.8	-49 42.2	1512.4	10.2	198
31	3	1975	4.0	830	23 9.3	-49 43.1	1515.1	6.0	199
31	3	1975	4.0	845	23 7.8	-49 43.7	1516.6	0.4	219
31	3	1975	4.0	1026	23 7.3	-49 44.2	1517.4	0.3	326
31	3	1975	4.0	1139	23 7.6	-49 44.4	1517.7	5.1	200
31	3	1975	4.0	1147	23 6.9	-49 44.6	1518.4	9.8	198
31	3	1975	4.0	1312	22 53.7	-49 49.4	1532.3	9.2	199
31	3	1975	4.0	1430	22 42.4	-49 53.6	1544.3	9.5	199
31	3	1975	4.0	1514	22 35.8	-49 56.1	1551.3	10.3	193
31	3	1975	4.0	1545	22 30.6	-49 57.4	1556.6	8.8	290
31	3	1975	4.0	1658	22 34.2	-50 8.3	1567.3	8.8	288
31	3	1975	4.0	1830	22 38.5	-50 22.3	1580.9	8.8	288
31	3	1975	4.0	1932	22 41.4	-50 31.6	1590.0	8.4	285
31	3	1975	4.0	20 0	22 42.4	-50 35.7	1593.9	9.0	284
31	3	1975	4.0	21 0	22 44.6	-50 45.2	1602.9	9.7	284
31	3	1975	4.0	2118	22 45.3	-50 48.2	1605.8	9.8	283
31	3	1975	4.0	22 0	22 46.8	-50 55.5	1612.6	8.5	17
31	3	1975	4.0	2244	22 52.8	-50 53.6	1618.9	8.9	12

DAY	MON	YEAR	TZ	TIME	LATITUDE		LONGITUDE		DISTANCE	SPEED	COURSE
1	4	1975	4.0	0 0	23	3.8	-50	51.0	1630.1	9.1	108
1	4	1975	4.0	3 0	22	55.4	-50	22.7	1657.6	9.3	108
1	4	1975	4.0	3 4	22	55.2	-50	22.0	1658.2	8.7	103
1	4	1975	4.0	450	22	51.6	-50	5.7	1673.6	8.6	107
1	4	1975	4.0	542	22	49.4	-49	58.1	1681.0	8.5	108
1	4	1975	4.0	6 0	22	48.6	-49	55.4	1683.6	9.2	108
1	4	1975	4.0	650	22	46.3	-49	47.5	1691.2	9.9	105
1	4	1975	4.0	656	22	46.1	-49	46.5	1692.2	8.3	12
1	4	1975	4.0	724	22	49.9	-49	45.6	1696.1	7.9	20
1	4	1975	4.0	748	22	52.9	-49	44.5	1699.3	9.4	286
1	4	1975	4.0	910	22	56.5	-49	57.8	1712.1	8.8	288
1	4	1975	4.0	936	22	57.6	-50	1.8	1715.9	9.0	289
1	4	1975	4.0	1030	23	0.3	-50	10.1	1724.0	8.9	289
1	4	1975	4.0	1032	23	0.4	-50	10.4	1724.3	8.9	289
1	4	1975	4.0	12 4	23	5.0	-50	24.5	1738.0	8.8	278
1	4	1975	4.0	1218	23	5.2	-50	26.7	1740.1	9.4	275
1	4	1975	4.0	1430	23	7.0	-50	49.1	1760.8	9.4	57
1	4	1975	4.0	16 8	23	15.2	-50	35.1	1776.1	9.6	54
1	4	1975	4.0	1619	23	16.3	-50	33.5	1777.9	9.5	181
1	4	1975	4.0	1722	23	6.3	-50	33.7	1787.8	10.6	183
1	4	1975	4.0	1741	23	3.0	-50	33.9	1791.2	8.6	49
1	4	1975	4.0	1810	23	5.7	-50	30.5	1795.3	8.0	46
1	4	1975	4.0	1844	23	8.8	-50	27.0	1799.9	8.3	46
1	4	1975	4.0	19 8	23	11.1	-50	24.4	1803.2	9.8	47
1	4	1975	4.0	1922	23	12.7	-50	22.6	1805.5	9.9	156
1	4	1975	4.0	20 0	23	6.9	-50	19.8	1811.8	8.4	338
1	4	1975	4.0	2012	23	8.5	-50	20.5	1813.4	3.9	339
1	4	1975	4.0	2030	23	9.6	-50	20.9	1814.6	3.8	322
1	4	1975	4.0	2039	23	10.0	-50	21.3	1815.2	1.0	229
1	4	1975	4.0	2054	23	9.8	-50	21.5	1815.4	1.1	163
1	4	1975	4.0	2148	23	8.9	-50	21.2	1816.4	0.6	193
1	4	1975	4.0	2242	23	8.4	-50	21.4	1816.9	0.4	147
1	4	1975	4.0	2338	23	8.0	-50	21.1	1817.3	0.9	155
2	4	1975	4.0	045	23	7.2	-50	20.7	1818.3	3.9	27
2	4	1975	4.0	053	23	7.6	-50	20.4	1818.8	8.9	22
2	4	1975	4.0	122	23	11.6	-50	18.7	1823.1	8.6	20
2	4	1975	4.0	214	23	18.6	-50	16.0	1830.5	9.1	19
2	4	1975	4.0	240	23	22.3	-50	14.6	1834.5	8.1	15
2	4	1975	4.0	310	23	26.3	-50	13.4	1838.5	3.8	16
2	4	1975	4.0	324	23	27.1	-50	13.2	1839.4	9.5	15
2	4	1975	4.0	330	23	28.0	-50	12.9	1840.4	0.5	177
2	4	1975	4.0	4 0	23	27.8	-50	12.9	1840.6	1.6	89
2	4	1975	4.0	414	23	27.8	-50	12.5	1841.0	0.4	139
2	4	1975	4.0	6 2	23	27.2	-50	12.0	1841.7	0.4	135
2	4	1975	4.0	622	23	27.1	-50	11.8	1841.9	1.8	82
2	4	1975	4.0	634	23	27.2	-50	11.5	1842.2	0.7	202
2	4	1975	4.0	651	23	27.0	-50	11.5	1842.4	2.0	7
2	4	1975	4.0	7 0	23	27.3	-50	11.5	1842.7	8.4	10
2	4	1975	4.0	8 4	23	36.1	-50	9.8	1851.7	7.5	7
2	4	1975	4.0	820	23	38.1	-50	9.5	1853.7	7.8	16

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
2	4	1975	4.0	830	23 39.3	-50 9.1	1854.9	6.9	16
2	4	1975	4.0	844	23 40.8	-50 8.6	1856.6	8.3	14
2	4	1975	4.0	938	23 48.1	-50 6.7	1864.0	9.0	221
2	4	1975	4.0	1010	23 44.5	-50 10.2	1868.8	9.5	201
2	4	1975	4.0	11 0	23 37.1	-50 13.2	1876.7	9.2	178
2	4	1975	4.0	1124	23 33.4	-50 13.0	1880.4	9.0	182
2	4	1975	4.0	1130	23 32.5	-50 13.1	1881.3	0.4	308
2	4	1975	4.0	1131	23 32.5	-50 13.1	1881.3	9.2	182
2	4	1975	4.0	12 4	23 27.4	-50 13.3	1886.3	9.2	205
2	4	1975	4.0	13 6	23 18.8	-50 17.7	1895.9	9.0	203
2	4	1975	4.0	15 0	23 3.0	-50 25.0	1913.1	9.0	203
2	4	1975	4.0	1522	22 59.9	-50 26.4	1916.4	9.4	206
2	4	1975	4.0	1648	22 47.8	-50 32.8	1929.9	3.4	20
2	4	1975	4.0	17 5	22 48.7	-50 32.4	1930.9	7.8	25
2	4	1975	4.0	1722	22 50.7	-50 31.4	1933.1	7.2	28
2	4	1975	4.0	18 0	22 54.7	-50 29.1	1937.6	7.0	25
2	4	1975	4.0	1942	23 5.5	-50 23.6	1949.6	7.3	28
2	4	1975	4.0	20 4	23 7.9	-50 22.3	1952.2	7.0	29
2	4	1975	4.0	2015	23 9.0	-50 21.6	1953.5	4.0	30
2	4	1975	4.0	2026	23 9.7	-50 21.2	1954.2	0.9	198
2	4	1975	4.0	2112	23 9.0	-50 21.4	1955.0	3.5	19
2	4	1975	4.0	2128	23 9.9	-50 21.1	1955.9	3.0	2
2	4	1975	4.0	2138	23 10.4	-50 21.1	1956.4	6.9	12
2	4	1975	4.0	2150	23 11.7	-50 20.8	1957.8	7.4	17
2	4	1975	4.0	2240	23 17.6	-50 18.8	1963.9	7.5	21
3	4	1975	4.0	0 0	23 26.9	-50 15.0	1973.9	3.5	23
3	4	1975	4.0	026	23 28.3	-50 14.3	1975.4	4.2	17
3	4	1975	4.0	116	23 31.6	-50 13.2	1978.9	9.6	181
3	4	1975	4.0	135	23 28.6	-50 13.2	1981.9	0.2	243
3	4	1975	4.0	312	23 28.5	-50 13.5	1982.2	0.5	264
3	4	1975	4.0	5 0	23 28.4	-50 14.4	1983.1	1.2	96
3	4	1975	4.0	7 0	23 28.1	-50 11.9	1985.4	0.2	256
3	4	1975	4.0	732	23 28.1	-50 12.1	1985.5	0.2	42
3	4	1975	4.0	754	23 28.1	-50 12.0	1985.5	0.6	227
3	4	1975	4.0	918	23 27.6	-50 12.7	1986.4	0.5	198
3	4	1975	4.0	1028	23 27.0	-50 12.9	1987.0	0.8	303
3	4	1975	4.0	1214	23 27.7	-50 14.1	1988.3	1.0	238
3	4	1975	4.0	13 0	23 27.3	-50 14.8	1989.1	7.1	58
3	4	1975	4.0	1320	23 28.6	-50 12.6	1991.5	1.0	238
3	4	1975	4.0	1432	23 28.0	-50 13.7	1992.6	0.6	245
3	4	1975	4.0	15 0	23 27.8	-50 14.0	1992.9	7.2	70
3	4	1975	4.0	1517	23 28.5	-50 11.9	1994.9	0.6	245
3	4	1975	4.0	1618	23 28.3	-50 12.5	1995.6	0.8	262
3	4	1975	4.0	1634	23 28.2	-50 12.7	1995.8	0.7	229
3	4	1975	4.0	1818	23 27.5	-50 13.7	1996.9	0.9	262
3	4	1975	4.0	1840	23 27.4	-50 14.0	1997.3	0.6	229
3	4	1975	4.0	1856	23 27.3	-50 14.2	1997.4	0.4	218
3	4	1975	4.0	2040	23 26.8	-50 14.6	1998.1	1.2	267
3	4	1975	4.0	21 0	23 26.8	-50 15.1	1998.5	0.5	249
3	4	1975	4.0	2110	23 26.7	-50 15.2	1998.6	7.6	43

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
3	4	1975	4.0	2130	23 28.6	-50 13.3	2001.1	0.5	249
3	4	1975	4.0	2246	23 28.3	-50 13.9	2001.8	0.8	247
3	4	1975	4.0	2332	23 28.1	-50 14.5	2002.4	0.4	277
4	4	1975	4.0	020	23 28.2	-50 14.9	2002.7	7.5	84
4	4	1975	4.0	039	23 28.4	-50 12.3	2005.1	0.4	277
4	4	1975	4.0	118	23 28.4	-50 12.6	2005.3	0.2	289
4	4	1975	4.0	224	23 28.5	-50 12.9	2005.6	0.1	266
4	4	1975	4.0	3 0	23 28.5	-50 12.9	2005.7	4.3	210
4	4	1975	4.0	317	23 27.5	-50 13.6	2006.9	9.5	210
4	4	1975	4.0	345	23 23.6	-50 16.0	2011.3	9.9	317
4	4	1975	4.0	410	23 26.6	-50 19.0	2015.4	8.9	318
4	4	1975	4.0	426	23 28.4	-50 20.8	2017.8	10.0	317
4	4	1975	4.0	445	23 30.7	-50 23.1	2021.0	9.2	177
4	4	1975	4.0	454	23 29.4	-50 23.0	2022.4	0.2	295
4	4	1975	4.0	5 5	23 29.4	-50 23.1	2022.4	9.4	177
4	4	1975	4.0	554	23 21.7	-50 22.7	2030.1	10.4	176
4	4	1975	4.0	6 9	23 19.1	-50 22.5	2032.7	8.8	327
4	4	1975	4.0	644	23 23.4	-50 25.5	2037.9	8.9	330
4	4	1975	4.0	738	23 30.3	-50 29.8	2045.9	10.2	335
4	4	1975	4.0	745	23 31.4	-50 30.4	2047.1	8.8	191
4	4	1975	4.0	832	23 24.7	-50 31.8	2053.9	8.8	187
4	4	1975	4.0	850	23 22.1	-50 32.1	2056.6	9.2	194
4	4	1975	4.0	1030	23 7.2	-50 36.1	2071.9	9.0	194
4	4	1975	4.0	1036	23 6.3	-50 36.4	2072.8	9.1	193
4	4	1975	4.0	1120	22 59.8	-50 38.1	2079.5	9.6	197
4	4	1975	4.0	1136	22 57.4	-50 38.9	2082.0	8.7	197
4	4	1975	4.0	1230	22 49.9	-50 41.4	2089.8	8.2	55
4	4	1975	4.0	13 6	22 52.7	-50 37.1	2094.7	7.7	55
4	4	1975	4.0	1346	22 55.7	-50 32.5	2099.9	7.8	59
4	4	1975	4.0	1530	23 2.7	-50 20.0	2113.4	6.9	59
4	4	1975	4.0	1532	23 2.8	-50 19.7	2113.6	8.0	59
4	4	1975	4.0	1728	23 10.8	-50 5.3	2129.1	8.5	59
4	4	1975	4.0	18 4	23 13.5	-50 0.6	2134.2	7.6	60
4	4	1975	4.0	1830	23 15.2	-49 57.5	2137.5	8.1	59
4	4	1975	4.0	20 8	23 21.9	-49 45.1	2150.7	8.6	63
4	4	1975	4.0	2030	23 23.3	-49 42.1	2153.9	8.2	285
4	4	1975	4.0	2138	23 25.7	-49 51.9	2163.2	8.0	289
4	4	1975	4.0	2154	23 26.4	-49 54.1	2165.3	8.3	286
4	4	1975	4.0	2236	23 28.0	-50 0.2	2171.1	8.1	286
4	4	1975	4.0	23 0	23 28.9	-50 3.5	2174.4	8.1	286
5	4	1975	4.0	022	23 32.0	-50 15.1	2185.4	8.3	285
5	4	1975	4.0	040	23 32.6	-50 17.7	2187.9	8.2	293
5	4	1975	4.0	136	23 35.7	-50 25.4	2195.5	8.3	295
5	4	1975	4.0	311	23 41.2	-50 38.4	2208.7	8.3	291
5	4	1975	4.0	324	23 41.8	-50 40.2	2210.5	8.6	291
5	4	1975	4.0	446	23 46.0	-50 52.2	2222.3	8.7	293
5	4	1975	4.0	511	23 47.5	-50 55.9	2225.9	8.4	291
5	4	1975	4.0	520	23 47.9	-50 57.2	2227.1	8.5	290
5	4	1975	4.0	632	23 51.5	-51 7.6	2237.3	8.0	292
5	4	1975	4.0	742	23 55.0	-51 17.0	2246.6	7.9	300

DAY	MON	YEAR	TZ	TIME	LATITUDE		LONGITUDE		DISTANCE	SPEED	COURSE
5	4	1975	4.0	756	23	55.9	-51	18.7	2248.4	7.7	291
5	4	1975	4.0	8 0	23	56.1	-51	19.2	2248.9	7.8	291
5	4	1975	4.0	928	24	0.2	-51	30.9	2260.4	7.4	297
5	4	1975	4.0	946	24	1.2	-51	33.1	2262.6	8.5	292
5	4	1975	4.0	1026	24	3.4	-51	38.8	2268.2	8.2	291
5	4	1975	4.0	11 0	24	5.1	-51	43.5	2272.9	7.9	291
5	4	1975	4.0	1210	24	8.5	-51	52.9	2282.1	8.1	292
5	4	1975	4.0	1230	24	9.5	-51	55.7	2284.8	7.9	286
5	4	1975	4.0	1442	24	14.3	-52	14.0	2302.2	7.8	286
5	4	1975	4.0	15 0	24	15.0	-52	16.5	2304.6	7.6	287
5	4	1975	4.0	1626	24	18.1	-52	28.0	2315.5	7.2	285
5	4	1975	4.0	18 0	24	21.0	-52	40.0	2326.8	6.9	285
5	4	1975	4.0	1812	24	21.3	-52	41.5	2328.2	6.7	285
5	4	1975	4.0	19 0	24	22.8	-52	47.1	2333.5	7.1	284
5	4	1975	4.0	1958	24	24.4	-52	54.4	2340.4	7.1	283
5	4	1975	4.0	2048	24	25.7	-53	0.7	2346.3	7.3	283
5	4	1975	4.0	21 0	24	26.1	-53	2.3	2347.8	6.9	283
5	4	1975	4.0	21 4	24	26.2	-53	2.8	2348.2	6.8	282
5	4	1975	4.0	2248	24	28.7	-53	15.5	2360.1	6.7	279
5	4	1975	4.0	23 0	24	28.9	-53	17.0	2361.4	7.6	342
5	4	1975	4.0	2328	24	32.3	-53	18.2	2365.0	8.1	341
6	4	1975	4.0	0 0	24	36.3	-53	19.7	2369.3	8.2	341
6	4	1975	4.0	114	24	45.9	-53	23.3	2379.4	8.3	343
6	4	1975	4.0	234	24	56.5	-53	26.9	2390.5	8.1	341
6	4	1975	4.0	3 0	24	59.8	-53	28.2	2394.0	8.2	341
6	4	1975	4.0	420	25	10.1	-53	32.2	2404.9	8.6	343
6	4	1975	4.0	435	25	12.2	-53	32.9	2407.1	5.7	232
6	4	1975	4.0	5 0	25	10.7	-53	35.0	2409.4	5.9	229
6	4	1975	4.0	524	25	9.2	-53	36.9	2411.8	6.0	231
6	4	1975	4.0	618	25	5.8	-53	41.5	2417.2	6.2	228
6	4	1975	4.0	654	25	3.3	-53	44.5	2420.9	5.7	232
6	4	1975	4.0	710	25	2.3	-53	45.9	2422.4	6.2	231
6	4	1975	4.0	8 0	24	59.1	-53	50.3	2427.6	6.1	231
6	4	1975	4.0	840	24	56.5	-53	53.8	2431.7	5.9	233
6	4	1975	4.0	1040	24	49.3	-54	4.2	2443.5	6.0	228
6	4	1975	4.0	11 0	24	48.0	-54	5.9	2445.5	6.0	228
6	4	1975	4.0	1116	24	46.9	-54	7.2	2447.1	6.4	225
6	4	1975	4.0	1222	24	41.9	-54	12.6	2454.2	7.9	346
6	4	1975	4.0	13 2	24	47.0	-54	14.0	2459.4	7.4	349
6	4	1975	4.0	1354	24	53.3	-54	15.4	2465.9	7.8	352
6	4	1975	4.0	1530	25	5.7	-54	17.5	2478.4	6.5	268
6	4	1975	4.0	1540	25	5.6	-54	18.7	2479.5	5.8	273
6	4	1975	4.0	17 6	25	6.1	-54	27.8	2487.8	6.3	272
6	4	1975	4.0	1715	25	6.2	-54	28.9	2488.7	6.5	213
6	4	1975	4.0	1736	25	4.2	-54	30.2	2491.0	6.2	210
6	4	1975	4.0	1852	24	57.4	-54	34.5	2498.9	6.5	215
6	4	1975	4.0	1930	24	54.0	-54	37.1	2503.0	6.4	215
6	4	1975	4.0	1958	24	51.6	-54	39.0	2506.0	6.9	217
6	4	1975	4.0	2030	24	48.7	-54	41.5	2509.6	7.9	334
6	4	1975	4.0	2144	24	57.4	-54	46.3	2519.4	7.1	334

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
6	4	1975	4.0	22 0	24 59.1	-54 47.2	2521.4	8.0	336
6	4	1975	4.0	2227	25 2.4	-54 48.8	2525.0	7.1	195
6	4	1975	4.0	2230	25 2.1	-54 48.9	2525.3	6.8	197
7	4	1975	4.0	0 0	24 52.3	-54 52.3	2535.6	7.1	197
7	4	1975	4.0	018	24 50.3	-54 53.0	2537.7	7.5	197
7	4	1975	4.0	045	24 47.0	-54 54.1	2541.1	7.3	303
7	4	1975	4.0	146	24 51.1	-55 0.9	2548.5	7.1	306
7	4	1975	4.0	330	24 58.2	-55 11.9	2560.8	7.0	306
7	4	1975	4.0	332	24 58.4	-55 12.1	2561.0	7.5	305
7	4	1975	4.0	425	25 2.1	-55 18.1	2567.6	7.2	205
7	4	1975	4.0	528	24 55.2	-55 21.6	2575.2	7.5	205
7	4	1975	4.0	6 2	24 51.4	-55 23.6	2579.4	7.9	202
7	4	1975	4.0	651	24 45.4	-55 26.3	2585.9	7.9	350
7	4	1975	4.0	746	24 52.5	-55 27.6	2593.2	7.9	351
7	4	1975	4.0	938	25 7.0	-55 30.2	2607.9	7.7	349
7	4	1975	4.0	10 0	25 9.8	-55 30.8	2610.7	7.5	278
7	4	1975	4.0	12 6	25 12.0	-55 48.0	2626.4	7.2	283
7	4	1975	4.0	1251	25 13.2	-55 53.8	2631.8	7.2	285
7	4	1975	4.0	1452	25 17.1	-56 9.3	2646.3	7.6	284
7	4	1975	4.0	1520	25 18.0	-56 13.2	2649.9	0.2	110
7	4	1975	4.0	1521	25 18.0	-56 13.1	2649.9	7.4	282
7	4	1975	4.0	1648	25 20.2	-56 24.7	2660.6	7.2	279
7	4	1975	4.0	1744	25 21.2	-56 32.0	2667.3	7.6	280
7	4	1975	4.0	1830	25 22.2	-56 38.4	2673.1	7.6	280
7	4	1975	4.0	1910	25 23.1	-56 43.9	2678.2	7.3	281
7	4	1975	4.0	1928	25 23.5	-56 46.3	2680.4	7.2	281
7	4	1975	4.0	2058	25 25.5	-56 58.0	2691.1	7.0	282
7	4	1975	4.0	2130	25 26.3	-57 2.0	2694.8	6.7	282
7	4	1975	4.0	22 0	25 27.0	-57 5.7	2698.2	7.1	289
7	4	1975	4.0	2250	25 28.9	-57 11.9	2704.1	8.1	290
7	4	1975	4.0	23 0	25 29.4	-57 13.3	2705.5	4.6	104
7	4	1975	4.0	2316	25 29.1	-57 12.0	2706.7	0.4	334
7	4	1975	4.0	2322	25 29.1	-57 12.0	2706.8	0.7	100
8	4	1975	4.0	110	25 28.9	-57 10.7	2708.0	0.7	110
8	4	1975	4.0	230	25 28.6	-57 9.6	2709.0	2.8	295
8	4	1975	4.0	246	25 28.9	-57 10.4	2709.7	2.7	297
8	4	1975	4.0	330	25 29.8	-57 12.3	2711.7	7.2	295
8	4	1975	4.0	430	25 32.9	-57 19.6	2718.9	7.2	296
8	4	1975	4.0	626	25 39.0	-57 33.3	2732.8	7.5	299
8	4	1975	4.0	630	25 39.3	-57 33.8	2733.3	7.4	299
8	4	1975	4.0	7 4	25 41.3	-57 37.9	2737.5	7.5	299
8	4	1975	4.0	826	25 46.2	-57 47.8	2747.7	6.6	303
8	4	1975	4.0	850	25 47.6	-57 50.3	2750.3	7.5	296
8	4	1975	4.0	930	25 49.9	-57 55.3	2755.3	7.2	297
8	4	1975	4.0	1042	25 53.7	-58 3.9	2764.0	7.6	297
8	4	1975	4.0	1112	25 55.4	-58 7.6	2767.8	6.9	298
8	4	1975	4.0	1210	25 58.5	-58 14.2	2774.4	1.9	307
8	4	1975	4.0	1224	25 58.8	-58 14.6	2774.9	0.8	82
8	4	1975	4.0	13 0	25 58.9	-58 14.0	2775.4	0.8	80
8	4	1975	4.0	1550	25 59.2	-58 11.7	2777.5	0.1	204

DAY	MON	YEAR	TZ	TIME	LATITUDE		LONGITUDE		DISTANCE	SPEED	COURSE
8	4	1975	4.0	1640	25	59.1	-58	11.7	2777.6	1.1	149
8	4	1975	4.0	1645	25	59.0	-58	11.7	2777.7	2.7	282
8	4	1975	4.0	17 2	25	59.2	-58	12.5	2778.4	5.8	289
8	4	1975	4.0	1744	26	0.5	-58	16.8	2782.5	6.6	292
8	4	1975	4.0	1822	26	2.1	-58	21.2	2786.7	6.5	290
8	4	1975	4.0	20 0	26	5.7	-58	32.3	2797.4	6.0	290
8	4	1975	4.0	20 8	26	6.0	-58	33.1	2798.2	5.9	292
8	4	1975	4.0	2035	26	7.0	-58	35.9	2800.8	3.3	289
8	4	1975	4.0	2128	26	7.9	-58	39.0	2803.8	6.0	292
8	4	1975	4.0	2154	26	8.9	-58	41.7	2806.4	6.5	294
8	4	1975	4.0	2228	26	10.4	-58	45.4	2810.1	6.2	293
9	4	1975	4.0	0 0	26	14.1	-58	55.2	2819.6	6.5	293
9	4	1975	4.0	016	26	14.8	-58	57.0	2821.3	6.4	294
9	4	1975	4.0	156	26	19.2	-59	7.8	2832.0	6.5	297
9	4	1975	4.0	3 0	26	22.3	-59	14.7	2838.9	6.7	297
9	4	1975	4.0	342	26	24.4	-59	19.4	2843.6	6.5	294
9	4	1975	4.0	530	26	29.2	-59	31.3	2855.3	6.4	294
9	4	1975	4.0	532	26	29.2	-59	31.5	2855.5	7.1	297
9	4	1975	4.0	630	26	32.3	-59	38.3	2862.3	8.3	156
9	4	1975	4.0	720	26	26.0	-59	35.1	2869.2	8.0	157
9	4	1975	4.0	8 0	26	21.1	-59	32.8	2874.6	8.2	156
9	4	1975	4.0	930	26	9.9	-59	27.2	2886.8	8.2	156
9	4	1975	4.0	946	26	7.9	-59	26.2	2889.0	7.6	154
9	4	1975	4.0	1018	26	4.3	-59	24.2	2893.0	8.2	157
9	4	1975	4.0	12 0	25	51.6	-59	18.0	2907.0	9.1	156
9	4	1975	4.0	12 4	25	51.0	-59	17.8	2907.6	9.2	155
9	4	1975	4.0	1430	25	30.8	-59	7.2	2929.9	9.1	155
9	4	1975	4.0	15 2	25	26.4	-59	5.0	2934.7	9.5	156
9	4	1975	4.0	1536	25	21.5	-59	2.5	2940.1	9.5	109
9	4	1975	4.0	1648	25	17.8	-58	50.7	2951.4	9.5	107
9	4	1975	4.0	1714	25	16.5	-58	46.3	2955.6	9.2	109
9	4	1975	4.0	1842	25	12.2	-58	32.1	2969.1	9.2	110
9	4	1975	4.0	1854	25	11.6	-58	30.2	2971.0	4.6	111
9	4	1975	4.0	19 4	25	11.3	-58	29.4	2971.7	5.1	116
9	4	1975	4.0	1912	25	11.0	-58	28.7	2972.4	0.7	193
9	4	1975	4.0	1918	25	10.9	-58	28.8	2972.5	0.5	108
9	4	1975	4.0	21 6	25	10.6	-58	27.8	2973.4	0.1	168
9	4	1975	4.0	2215	25	10.5	-58	27.7	2973.6	4.5	110
9	4	1975	4.0	2230	25	10.1	-58	26.6	2974.7	9.7	110
9	4	1975	4.0	2256	25	8.7	-58	22.2	2978.9	9.4	110
9	4	1975	4.0	2320	25	7.4	-58	18.3	2982.6	9.2	108
10	4	1975	4.0	1 6	25	2.5	-58	1.3	2998.8	9.2	105
10	4	1975	4.0	130	25	1.5	-57	57.4	3002.5	9.8	106
10	4	1975	4.0	218	24	59.4	-57	49.1	3010.3	8.6	107
10	4	1975	4.0	256	24	57.8	-57	43.3	3015.8	8.7	113
10	4	1975	4.0	318	24	56.5	-57	40.1	3019.0	9.3	115
10	4	1975	4.0	440	24	51.1	-57	27.3	3031.7	9.1	118
10	4	1975	4.0	6 0	24	45.4	-57	15.6	3043.9	9.0	118
10	4	1975	4.0	614	24	44.4	-57	13.5	3046.0	8.9	118
10	4	1975	4.0	634	24	43.0	-57	10.6	3048.9	9.5	111

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
10	4	1975	4.0	710	24 40.9	-57 4.8	3054.6	9.4	116
10	4	1975	4.0	756	24 37.8	-56 57.7	3061.8	9.6	115
10	4	1975	4.0	817	24 36.4	-56 54.3	3065.2	9.9	203
10	4	1975	4.0	9 0	24 29.8	-56 57.4	3072.2	10.0	200
10	4	1975	4.0	936	24 24.2	-56 59.7	3078.2	8.7	286
10	4	1975	4.0	1044	24 27.0	-57 10.1	3088.2	8.9	289
10	4	1975	4.0	11 8	24 28.2	-57 13.8	3091.7	9.0	285
10	4	1975	4.0	1230	24 31.3	-57 26.9	3104.0	8.9	285
10	4	1975	4.0	1254	24 32.2	-57 30.7	3107.6	9.1	285
10	4	1975	4.0	1414	24 35.3	-57 43.6	3119.7	9.4	288
10	4	1975	4.0	1424	24 35.8	-57 45.2	3121.3	4.3	286
10	4	1975	4.0	1439	24 36.1	-57 46.4	3122.4	0.5	244
10	4	1975	4.0	1558	24 35.8	-57 47.0	3123.0	0.2	290
10	4	1975	4.0	1736	24 35.9	-57 47.3	3123.3	5.0	300
10	4	1975	4.0	1746	24 36.3	-57 48.1	3124.1	9.0	300
10	4	1975	4.0	1830	24 39.6	-57 54.4	3130.7	9.4	302
10	4	1975	4.0	1940	24 45.3	-58 4.6	3141.6	9.1	304
10	4	1975	4.0	2018	24 48.5	-58 9.9	3147.4	8.8	301
10	4	1975	4.0	2039	24 50.1	-58 12.9	3150.5	9.1	288
10	4	1975	4.0	22 4	24 54.0	-58 26.3	3163.3	8.9	288
10	4	1975	4.0	2330	24 57.9	-58 39.8	3176.1	9.1	288
11	4	1975	4.0	010	24 59.7	-58 46.2	3182.2	8.1	286
11	4	1975	4.0	2 6	25 4.0	-59 2.8	3197.9	8.8	289
11	4	1975	4.0	236	25 5.5	-59 7.4	3202.3	6.8	201
11	4	1975	4.0	354	24 57.2	-59 10.9	3211.2	6.4	205
11	4	1975	4.0	5 6	24 50.2	-59 14.5	3218.8	6.7	206
11	4	1975	4.0	530	24 47.8	-59 15.8	3221.5	6.8	206
11	4	1975	4.0	546	24 46.2	-59 16.6	3223.3	7.3	209
11	4	1975	4.0	618	24 42.8	-59 18.7	3227.2	8.8	107
11	4	1975	4.0	654	24 41.2	-59 13.2	3232.5	8.7	111
11	4	1975	4.0	9 0	24 34.7	-58 54.3	3250.8	8.8	111
11	4	1975	4.0	954	24 31.9	-58 46.2	3258.7	9.0	108
11	4	1975	4.0	1158	24 26.3	-58 26.8	3277.3	8.8	107
11	4	1975	4.0	12 0	24 26.3	-58 26.5	3277.6	8.8	107
11	4	1975	4.0	1356	24 21.4	-58 8.7	3294.5	3.6	105
11	4	1975	4.0	1415	24 21.1	-58 7.4	3295.6	0.5	311
11	4	1975	4.0	1512	24 21.5	-58 7.9	3296.1	1.0	276
11	4	1975	4.0	1648	24 21.6	-58 9.6	3297.7	0.7	328
11	4	1975	4.0	1730	24 22.0	-58 9.9	3298.2	4.5	93
11	4	1975	4.0	1741	24 22.0	-58 9.0	3299.0	8.6	97
11	4	1975	4.0	1832	24 21.1	-58 1.0	3306.3	8.0	99
11	4	1975	4.0	1930	24 19.9	-57 52.7	3314.0	8.3	100
11	4	1975	4.0	2030	24 18.5	-57 43.7	3322.4	8.6	100
11	4	1975	4.0	2112	24 17.5	-57 37.2	3328.4	8.5	98
11	4	1975	4.0	23 0	24 15.3	-57 20.5	3343.7	8.9	99
11	4	1975	4.0	2330	24 14.6	-57 15.7	3348.2	8.9	99
12	4	1975	4.0	1 2	24 12.4	-57 1.0	3361.8	9.5	100
12	4	1975	4.0	230	24 10.0	-56 46.0	3375.6	7.9	100
12	4	1975	4.0	3 8	24 9.1	-56 40.6	3380.7	8.3	99
12	4	1975	4.0	530	24 6.0	-56 19.4	3400.3	11.0	99

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
12	4	1975	4.0	544	24 5.6	-56 16.6	3402.8	8.7	100
12	4	1975	4.0	720	24 3.2	-56 1.5	3416.8	10.0	97
12	4	1975	4.0	836	24 1.7	-55 47.7	3429.5	8.6	192
12	4	1975	4.0	1030	23 45.7	-55 51.5	3445.9	10.2	282
12	4	1975	4.0	1050	23 46.4	-55 55.1	3449.3	9.8	277
12	4	1975	4.0	11 6	23 46.7	-55 57.9	3451.9	9.3	281
12	4	1975	4.0	1250	23 49.6	-56 15.2	3468.0	9.5	279
12	4	1975	4.0	1330	23 50.6	-56 22.1	3474.3	9.9	279
12	4	1975	4.0	1424	23 52.0	-56 31.8	3483.3	9.4	281
12	4	1975	4.0	16 8	23 55.0	-56 49.2	3499.5	9.6	280
12	4	1975	4.0	1630	23 55.7	-56 53.0	3503.1	9.4	280
12	4	1975	4.0	18 0	23 58.2	-57 8.2	3517.1	9.0	285
12	4	1975	4.0	1840	23 59.7	-57 14.5	3523.1	9.4	282
12	4	1975	4.0	1912	24 0.7	-57 19.9	3528.2	9.7	282
12	4	1975	4.0	1930	24 1.4	-57 23.0	3531.1	9.6	282
12	4	1975	4.0	2020	24 3.1	-57 31.6	3539.1	9.6	280
12	4	1975	4.0	21 0	24 4.1	-57 38.5	3545.5	9.9	270
12	4	1975	4.0	22 6	24 4.2	-57 50.4	3556.3	10.3	271
12	4	1975	4.0	2222	24 4.3	-57 53.4	3559.1	9.6	265
12	4	1975	4.0	23 0	24 3.8	-58 0.0	3565.2	9.5	284
13	4	1975	4.0	0 0	24 6.1	-58 10.1	3574.7	9.6	284
13	4	1975	4.0	0 8	24 6.4	-58 11.5	3576.0	9.6	288
13	4	1975	4.0	214	24 12.5	-58 32.5	3596.0	9.3	287
13	4	1975	4.0	3 0	24 14.6	-58 39.9	3603.2	9.4	287
13	4	1975	4.0	4 2	24 17.4	-58 50.1	3612.8	10.2	282
13	4	1975	4.0	5 5	24 19.7	-59 1.6	3623.5	6.1	28
13	4	1975	4.0	552	24 23.9	-58 59.1	3628.3	5.4	27
13	4	1975	4.0	8 0	24 34.2	-58 53.4	3639.8	5.3	27
13	4	1975	4.0	810	24 35.0	-58 52.9	3640.7	5.5	23
13	4	1975	4.0	944	24 42.9	-58 49.2	3649.3	8.7	24
13	4	1975	4.0	958	24 44.7	-58 48.3	3651.3	8.8	21
13	4	1975	4.0	1012	24 46.6	-58 47.5	3653.4	9.8	25
13	4	1975	4.0	1130	24 58.2	-58 41.6	3666.1	9.6	37
13	4	1975	4.0	1158	25 1.8	-58 38.6	3670.6	10.1	37
13	4	1975	4.0	1245	25 8.1	-58 33.4	3678.5	10.1	358
13	4	1975	4.0	1522	25 34.6	-58 34.4	3705.0	10.5	360
13	4	1975	4.0	1545	25 38.6	-58 34.4	3709.0	9.9	352
13	4	1975	4.0	17 0	25 50.9	-58 36.3	3721.5	8.8	156
13	4	1975	4.0	1712	25 49.3	-58 35.5	3723.2	9.2	156
13	4	1975	4.0	18 6	25 41.8	-58 31.9	3731.5	8.8	156
13	4	1975	4.0	1938	25 29.4	-58 25.7	3745.0	8.2	154
13	4	1975	4.0	1954	25 27.4	-58 24.6	3747.2	9.5	155
13	4	1975	4.0	20 4	25 26.0	-58 23.9	3748.8	9.3	175
13	4	1975	4.0	2045	25 19.7	-58 23.3	3755.2	9.8	14
13	4	1975	4.0	2116	25 24.6	-58 21.9	3760.2	9.9	10
13	4	1975	4.0	2312	25 43.4	-58 18.1	3779.4	9.1	14
13	4	1975	4.0	2330	25 46.0	-58 17.4	3782.1	9.4	14
14	4	1975	4.0	128	26 4.0	-58 12.6	3800.6	10.5	8
14	4	1975	4.0	145	26 7.0	-58 12.2	3803.6	8.9	170
14	4	1975	4.0	314	25 53.9	-58 9.7	3816.8	9.0	168

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
14	4	1975	4.0	430	25 42.8	-58 7.2	3828.2	8.9	168
14	4	1975	4.0	5 6	25 37.5	-58 6.0	3833.5	8.9	168
14	4	1975	4.0	7 2	25 20.6	-58 2.0	3850.8	9.0	161
14	4	1975	4.0	730	25 16.6	-58 0.5	3855.0	9.3	168
14	4	1975	4.0	820	25 9.1	-57 58.7	3862.7	10.1	35
14	4	1975	4.0	9 8	25 15.7	-57 53.6	3870.8	10.3	35
14	4	1975	4.0	11 0	25 31.6	-57 41.3	3890.1	11.1	37
14	4	1975	4.0	11 3	25 32.0	-57 40.9	3890.7	10.5	37
14	4	1975	4.0	1118	25 34.1	-57 39.2	3893.3	6.3	39
14	4	1975	4.0	1130	25 35.1	-57 38.3	3894.6	1.3	55
14	4	1975	4.0	1246	25 36.0	-57 36.8	3896.3	1.1	64
14	4	1975	4.0	1434	25 36.9	-57 34.8	3898.2	0.4	73
14	4	1975	4.0	15 0	25 36.9	-57 34.6	3898.4	4.2	140
14	4	1975	4.0	1512	25 36.3	-57 34.0	3899.2	9.6	143
14	4	1975	4.0	1620	25 27.7	-57 26.8	3910.0	9.6	145
14	4	1975	4.0	17 0	25 22.4	-57 22.7	3916.4	9.8	147
14	4	1975	4.0	18 0	25 14.2	-57 16.7	3926.3	9.3	147
14	4	1975	4.0	1842	25 8.8	-57 12.8	3932.8	9.2	150
14	4	1975	4.0	1951	24 59.6	-57 7.0	3943.3	8.0	18
14	4	1975	4.0	2024	25 3.8	-57 5.4	3947.7	8.5	20
14	4	1975	4.0	22 0	25 16.6	-57 0.3	3961.3	9.7	156
14	4	1975	4.0	2210	25 15.1	-56 59.6	3963.0	9.7	161
14	4	1975	4.0	2340	25 1.4	-56 54.2	3977.5	7.9	33
15	4	1975	4.0	0 6	25 4.3	-56 52.2	3980.9	8.1	36
15	4	1975	4.0	2 5	25 17.3	-56 41.9	3997.0	9.9	163
15	4	1975	4.0	226	25 14.0	-56 40.8	4000.5	9.8	167
15	4	1975	4.0	412	24 57.1	-56 36.6	4017.7	10.0	165
15	4	1975	4.0	420	24 55.9	-56 36.2	4019.1	8.0	35
15	4	1975	4.0	556	25 6.3	-56 28.2	4031.8	7.9	33
15	4	1975	4.0	640	25 11.2	-56 24.8	4037.6	8.1	31
15	4	1975	4.0	655	25 12.9	-56 23.6	4039.6	10.1	188
15	4	1975	4.0	830	24 57.2	-56 26.2	4055.5	10.5	185
15	4	1975	4.0	910	24 50.2	-56 26.9	4062.5	7.9	36
15	4	1975	4.0	10 2	24 55.8	-56 22.4	4069.4	8.4	31
15	4	1975	4.0	1154	25 9.2	-56 13.6	4085.0	8.5	33
15	4	1975	4.0	1224	25 12.8	-56 11.0	4089.2	9.6	281
15	4	1975	4.0	1344	25 15.2	-56 24.9	4102.0	9.3	282
15	4	1975	4.0	15 0	25 17.6	-56 37.7	4113.8	9.3	282
15	4	1975	4.0	1538	25 18.8	-56 44.1	4119.7	9.3	284
15	4	1975	4.0	16 5	25 19.8	-56 48.5	4123.9	3.8	284
15	4	1975	4.0	1632	25 20.3	-56 50.4	4125.6	9.6	281
15	4	1975	4.0	1722	25 21.7	-56 59.0	4133.6	8.9	281
15	4	1975	4.0	1920	25 25.0	-57 18.0	4151.0	8.6	281
15	4	1975	4.0	1937	25 25.5	-57 20.6	4153.4	8.8	292
15	4	1975	4.0	2120	25 31.2	-57 36.1	4168.6	8.5	294
15	4	1975	4.0	2230	25 35.3	-57 46.2	4178.5	8.6	294
15	4	1975	4.0	23 8	25 37.6	-57 51.7	4184.0	8.7	288
16	4	1975	4.0	0 0	25 39.9	-57 59.7	4191.5	8.9	288
16	4	1975	4.0	054	25 42.3	-58 8.1	4199.5	9.0	292
16	4	1975	4.0	136	25 44.7	-58 14.6	4205.8	9.0	291

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
16	4	1975	4.0	210	25 46.6	-58 19.9	4210.9	9.3	284
16	4	1975	4.0	350	25 50.2	-58 36.7	4226.5	9.3	287
16	4	1975	4.0	448	25 52.8	-58 46.2	4235.4	9.6	285
16	4	1975	4.0	514	25 53.9	-58 50.7	4239.6	9.8	285
16	4	1975	4.0	544	25 55.1	-58 55.9	4244.5	9.8	287
16	4	1975	4.0	634	25 57.5	-59 4.6	4252.6	10.1	289
16	4	1975	4.0	724	26 0.3	-59 13.4	4261.0	10.3	282
16	4	1975	4.0	740	26 0.9	-59 16.4	4263.8	9.9	289
16	4	1975	4.0	830	26 3.6	-59 25.1	4272.0	10.0	289
16	4	1975	4.0	926	26 6.6	-59 34.9	4281.3	9.9	290
16	4	1975	4.0	11 0	26 11.9	-59 51.1	4296.8	9.8	290
16	4	1975	4.0	1145	26 14.5	-59 58.8	4304.2	9.2	175
16	4	1975	4.0	1242	26 5.8	-59 57.9	4312.9	8.2	177
16	4	1975	4.0	1312	26 1.7	-59 57.7	4317.0	8.8	177
16	4	1975	4.0	1345	25 56.8	-59 57.4	4321.8	3.0	176
16	4	1975	4.0	14 0	25 56.1	-59 57.4	4322.6	0.6	9
16	4	1975	4.0	1442	25 56.5	-59 57.3	4323.0	0.6	11
16	4	1975	4.0	1658	25 57.7	-59 57.0	4324.3	3.7	178
16	4	1975	4.0	1715	25 56.7	-59 57.0	4325.3	8.2	179
16	4	1975	4.0	1823	25 47.4	-59 56.8	4334.6	9.0	103
16	4	1975	4.0	1858	25 46.3	-59 51.1	4339.8	9.3	105
16	4	1975	4.0	2028	25 42.6	-59 36.2	4353.8	9.0	104
16	4	1975	4.0	2046	25 42.0	-59 33.3	4356.5	9.0	105
16	4	1975	4.0	2130	25 40.3	-59 26.2	4363.1	9.6	105
16	4	1975	4.0	2216	25 38.4	-59 18.3	4370.4	9.1	105
17	4	1975	4.0	0 0	25 34.2	-59 1.4	4386.3	9.2	104
17	4	1975	4.0	030	25 33.1	-58 56.5	4390.8	9.2	108
17	4	1975	4.0	236	25 27.0	-58 36.1	4410.2	9.4	107
17	4	1975	4.0	330	25 24.6	-58 27.2	4418.6	9.4	107
17	4	1975	4.0	528	25 19.2	-58 7.6	4437.1	9.6	107
17	4	1975	4.0	610	25 17.2	-58 0.5	4443.8	9.2	105
17	4	1975	4.0	630	25 16.4	-57 57.2	4446.9	9.1	105
17	4	1975	4.0	650	25 15.7	-57 53.9	4450.0	8.7	107
17	4	1975	4.0	712	25 14.7	-57 50.6	4453.2	9.0	108
17	4	1975	4.0	818	25 11.6	-57 40.2	4463.1	8.9	109
17	4	1975	4.0	930	25 8.1	-57 29.0	4473.8	8.8	109
17	4	1975	4.0	10 0	25 6.6	-57 24.4	4478.2	8.7	111
17	4	1975	4.0	1148	25 0.9	-57 8.4	4493.8	9.2	111
17	4	1975	4.0	1215	24 59.4	-57 4.1	4497.9	9.1	103
17	4	1975	4.0	13 0	24 57.9	-56 56.7	4504.8	9.5	192
17	4	1975	4.0	1346	24 50.8	-56 58.4	4512.1	10.1	285
17	4	1975	4.0	1354	24 51.1	-56 59.8	4513.4	9.7	286
17	4	1975	4.0	1540	24 56.0	-57 18.0	4530.6	9.9	285
17	4	1975	4.0	16 0	24 56.8	-57 21.5	4533.9	9.9	290
17	4	1975	4.0	17 8	25 0.6	-57 33.1	4545.0	9.8	291
17	4	1975	4.0	1728	25 1.7	-57 36.5	4548.3	9.6	293
17	4	1975	4.0	1740	25 2.5	-57 38.4	4550.2	9.7	298
17	4	1975	4.0	18 8	25 4.6	-57 42.8	4554.8	9.7	297
17	4	1975	4.0	1854	25 8.0	-57 50.1	4562.2	9.6	298
17	4	1975	4.0	1936	25 11.2	-57 56.7	4568.9	10.1	296

DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
17	4	1975	4.0	1946	25 11.9	-57 58.4	4570.6	10.1	285
17	4	1975	4.0	1956	25 12.4	-58 0.2	4572.3	9.5	289
17	4	1975	4.0	2122	25 16.8	-58 14.4	4585.9	8.8	290
17	4	1975	4.0	2230	25 20.2	-58 24.8	4595.9	8.8	290
17	4	1975	4.0	23 4	25 21.9	-58 30.0	4600.9	8.8	287
18	4	1975	4.0	0 C	25 24.3	-58 38.7	4609.1	8.5	287
18	4	1975	4.0	015	25 25.0	-58 40.9	4611.2	1.2	89
18	4	1975	4.0	016	25 25.0	-58 40.9	4611.2	8.4	276
18	4	1975	4.0	048	25 25.4	-58 45.8	4615.7	8.6	273
18	4	1975	4.0	216	25 26.1	-58 59.8	4628.4	9.6	353
18	4	1975	4.0	332	25 38.2	-59 1.5	4640.6	9.6	347
18	4	1975	4.0	420	25 45.8	-59 3.4	4648.3	9.3	346
18	4	1975	4.0	430	25 47.3	-59 3.9	4649.8	8.8	345
18	4	1975	4.0	5 0	25 51.5	-59 5.1	4654.2	8.9	345
18	4	1975	4.0	520	25 54.4	-59 5.9	4657.2	9.9	346
18	4	1975	4.0	551	25 59.4	-59 7.2	4662.3	10.1	205
18	4	1975	4.0	719	25 45.9	-59 14.1	4677.1	4.9	206
18	4	1975	4.0	728	25 45.3	-59 14.5	4677.8	5.2	208
18	4	1975	4.0	735	25 44.7	-59 14.8	4678.4	0.5	262
18	4	1975	4.0	750	25 44.7	-59 14.9	4678.5	0.5	266
18	4	1975	4.0	934	25 44.7	-59 15.9	4679.4	0.2	236
18	4	1975	4.0	1054	25 44.5	-59 16.2	4679.7	1.0	283
18	4	1975	4.0	1137	25 44.7	-59 16.9	4680.4	4.3	308
18	4	1975	4.0	1151	25 45.3	-59 17.8	4681.4	10.1	312
18	4	1975	4.0	1336	25 57.1	-59 32.4	4699.1	10.1	225
18	4	1975	4.0	1454	25 47.8	-59 42.7	4712.2	8.7	219
18	4	1975	4.0	1630	25 37.1	-59 52.4	4726.1	8.6	219
18	4	1975	4.0	1748	25 28.5	-60 0.2	4737.2	8.7	218
18	4	1975	4.0	1830	25 23.7	-60 4.4	4743.3	8.6	218
18	4	1975	4.0	19 6	25 19.6	-60 7.9	4748.5	8.8	218
18	4	1975	4.0	1915	25 18.5	-60 8.8	4749.8	9.0	218
18	4	1975	4.0	1934	25 16.3	-60 10.7	4752.7	9.1	221
18	4	1975	4.0	2032	25 9.6	-60 17.1	4761.5	9.8	223
18	4	1975	4.0	2054	25 7.0	-60 19.8	4765.1	9.0	224
18	4	1975	4.0	22 0	24 59.9	-60 27.3	4774.9	8.3	224
18	4	1975	4.0	2210	24 58.9	-60 28.4	4776.3	8.5	224
18	4	1975	4.0	2230	24 56.8	-60 30.6	4779.1	9.3	223
18	4	1975	4.0	2356	24 47.1	-60 40.6	4792.5	8.9	221
19	4	1975	4.0	0 0	24 46.7	-60 41.1	4793.1	9.1	221
19	4	1975	4.0	246	24 27.7	-60 59.1	4818.1	9.4	219
19	4	1975	4.0	3 0	24 26.0	-61 0.6	4820.3	9.5	219
19	4	1975	4.0	430	24 15.0	-61 10.5	4834.5	9.7	218
19	4	1975	4.0	458	24 11.4	-61 13.5	4839.1	9.4	219
19	4	1975	4.0	6 0	24 3.9	-61 20.2	4848.8	9.4	219
19	4	1975	4.0	618	24 1.8	-61 22.2	4851.6	8.7	216
19	4	1975	4.0	646	23 58.5	-61 24.8	4855.6	8.8	219
19	4	1975	4.0	822	23 47.5	-61 34.5	4869.7	8.9	219
19	4	1975	4.0	846	23 44.7	-61 36.9	4873.3	9.5	222
19	4	1975	4.0	9 0	23 43.1	-61 38.5	4875.5	9.4	222
19	4	1975	4.0	939	23 38.5	-61 43.0	4881.6	4.4	224

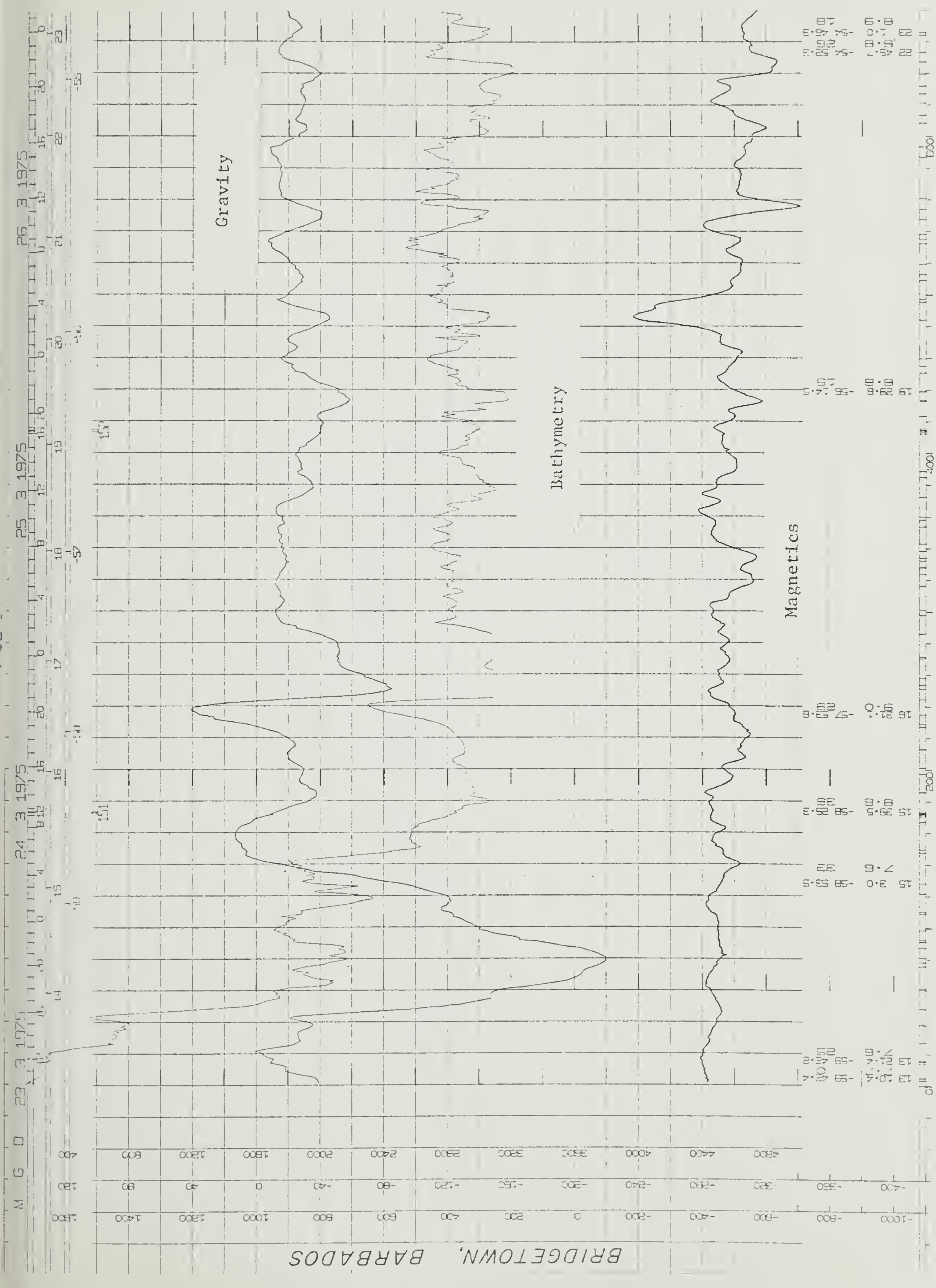
DAY	MON	YEAR	TZ	TIME	LATITUDE	LONGITUDE	DISTANCE	SPEED	COURSE
19	4	1975	4.0	957	23 37.6	-61 44.0	4882.9	9.5	222
19	4	1975	4.0	10 8	23 36.3	-61 45.2	4884.6	9.1	223
19	4	1975	4.0	1146	23 25.4	-61 56.4	4899.5	9.7	221
19	4	1975	4.0	1230	23 20.1	-62 1.5	4906.6	9.0	222
19	4	1975	4.0	14 0	23 10.0	-62 11.2	4920.1	9.4	222
19	4	1975	4.0	1548	22 57.4	-62 23.4	4937.0	8.9	225
19	4	1975	4.0	1642	22 51.7	-62 29.5	4945.0	8.5	222
19	4	1975	4.0	17 0	22 49.8	-62 31.3	4947.5	8.7	222
19	4	1975	4.0	1738	22 45.7	-62 35.4	4953.1	8.6	221
19	4	1975	4.0	1940	22 32.6	-62 47.7	4970.4	8.7	222
19	4	1975	4.0	20 0	22 30.5	-62 49.8	4973.3	8.5	218
19	4	1975	4.0	2126	22 21.0	-62 58.0	4985.5	9.4	215
19	4	1975	4.0	2152	22 17.6	-63 0.5	4989.5	9.1	217
19	4	1975	4.0	22 0	22 16.6	-63 1.3	4990.8	8.3	217
19	4	1975	4.0	23 0	22 10.0	-63 6.7	4999.1	8.9	215
20	4	1975	4.0	0 0	22 2.8	-63 12.3	5008.0	9.0	215
20	4	1975	4.0	048	21 56.9	-63 16.8	5015.2	9.1	215
20	4	1975	4.0	156	21 48.5	-63 23.1	5025.4	9.2	218
20	4	1975	4.0	3 0	21 40.8	-63 29.7	5035.2	9.2	218
20	4	1975	4.0	340	21 36.0	-63 33.8	5041.4	9.1	221
20	4	1975	4.0	540	21 22.1	-63 46.5	5059.7	9.3	222
20	4	1975	4.0	6 0	21 19.8	-63 48.8	5062.8	8.8	222
20	4	1975	4.0	724	21 10.6	-63 57.7	5075.1	8.8	221
20	4	1975	4.0	9 0	20 59.9	-64 7.6	5089.3	8.9	221
20	4	1975	4.0	942	20 55.2	-64 12.0	5095.5	8.9	221
20	4	1975	4.0	10 0	20 53.1	-64 13.9	5098.2	9.3	215
20	4	1975	4.0	1048	20 47.1	-64 18.4	5105.6	9.2	216
20	4	1975	4.0	12 0	20 38.1	-64 25.3	5116.7	8.5	216
20	4	1975	4.0	15 0	20 17.4	-64 41.3	5142.2	9.4	216
20	4	1975	4.0	1720	19 59.6	-64 54.8	5164.1	9.2	215
20	4	1975	4.0	18 0	19 54.6	-64 58.6	5170.2	9.4	215
20	4	1975	4.0	1834	19 50.3	-65 1.9	5175.5	10.4	214
20	4	1975	4.0	19 2	19 46.3	-65 4.7	5180.4	10.0	214
20	4	1975	4.0	1920	19 43.8	-65 6.5	5183.4	9.6	214
20	4	1975	4.0	20 0	19 38.4	-65 10.3	5189.8	10.3	214
20	4	1975	4.0	2036	19 33.3	-65 14.0	5196.0	10.2	213
20	4	1975	4.0	21 4	19 29.3	-65 16.7	5200.8	10.2	213
20	4	1975	4.0	2224	19 17.9	-65 24.6	5214.3	10.1	210
20	4	1975	4.0	23 0	19 12.7	-65 27.9	5220.4	10.3	223
20	4	1975	4.0	2354	19 5.9	-65 34.6	5229.7	11.6	223
21	4	1975	4.0	0 0	19 5.0	-65 35.4	5230.8	12.0	223
21	4	1975	4.0	320	18 35.7	-66 3.9	5270.7	11.6	218
21	4	1975	4.0	4 0	18 29.6	-66 8.9	5278.4		

PART B

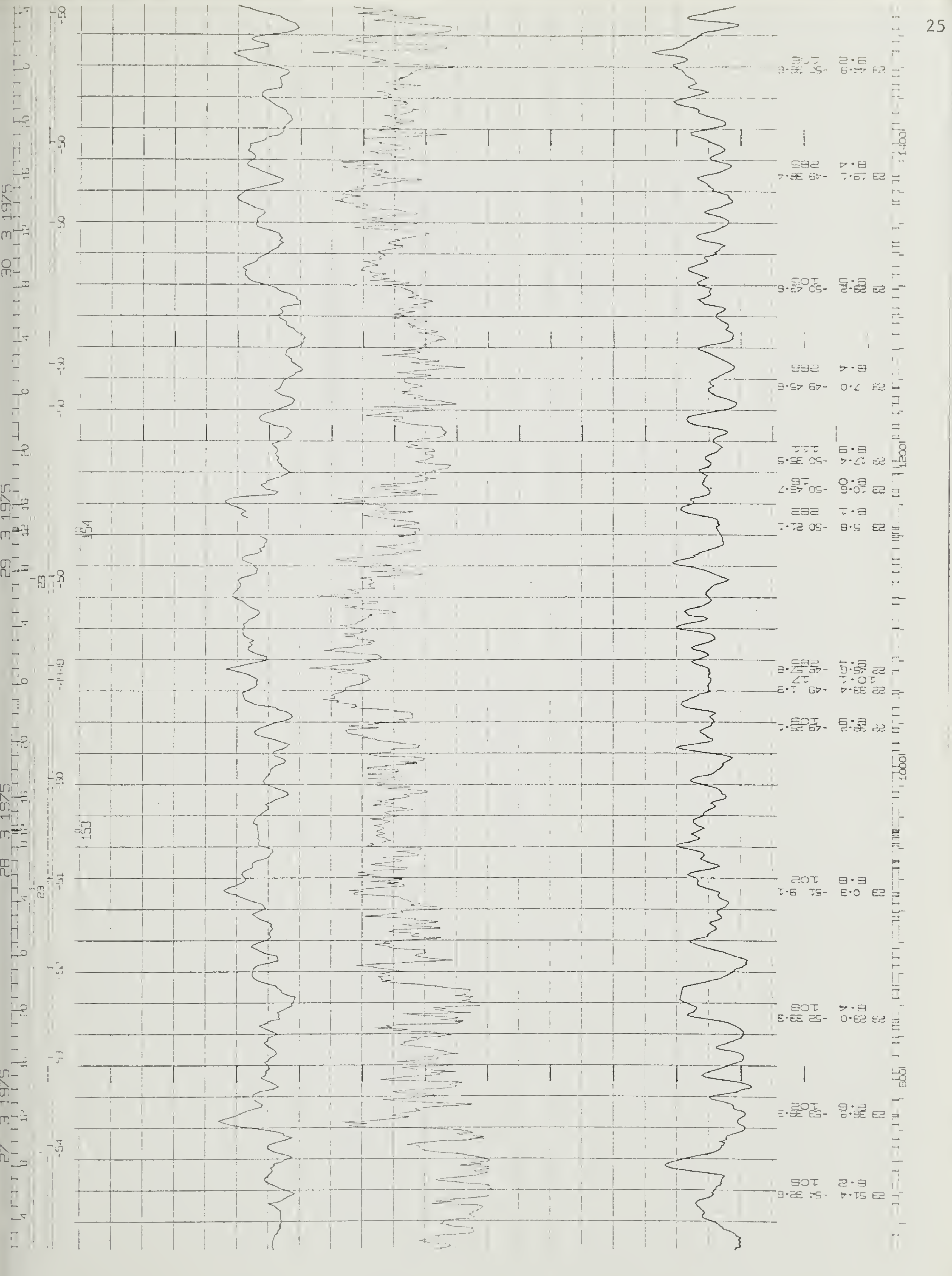
Bathymetric, Geomagnetic and Gravity profiles

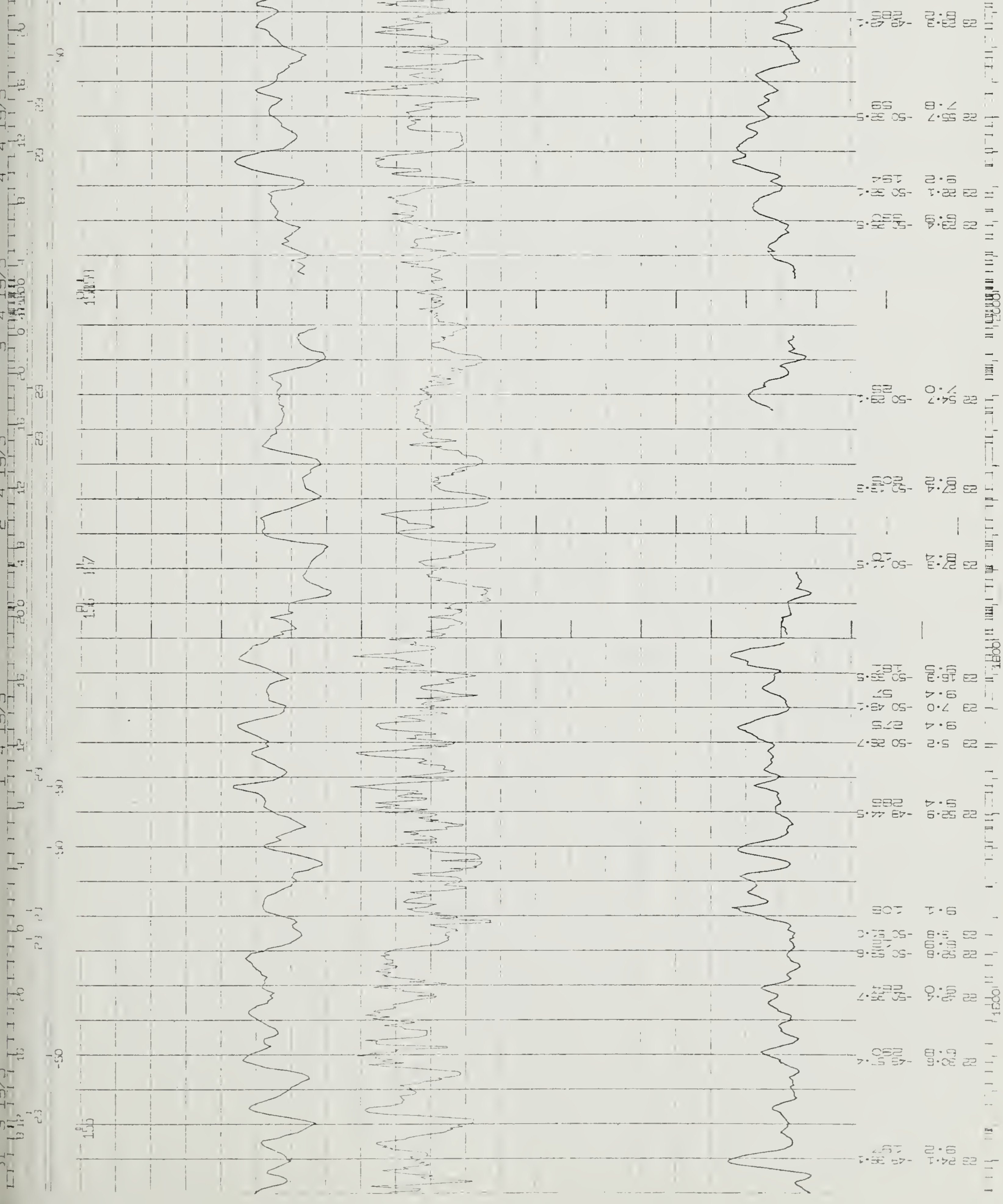
All bathymetric, gravimetric, magnetic and navigational data were digitized and reduced with the aid of an IBM 1130 digital computer and on-line Calcomp plotter. The entire data processing procedure including program listings is given in Talwani (1969).

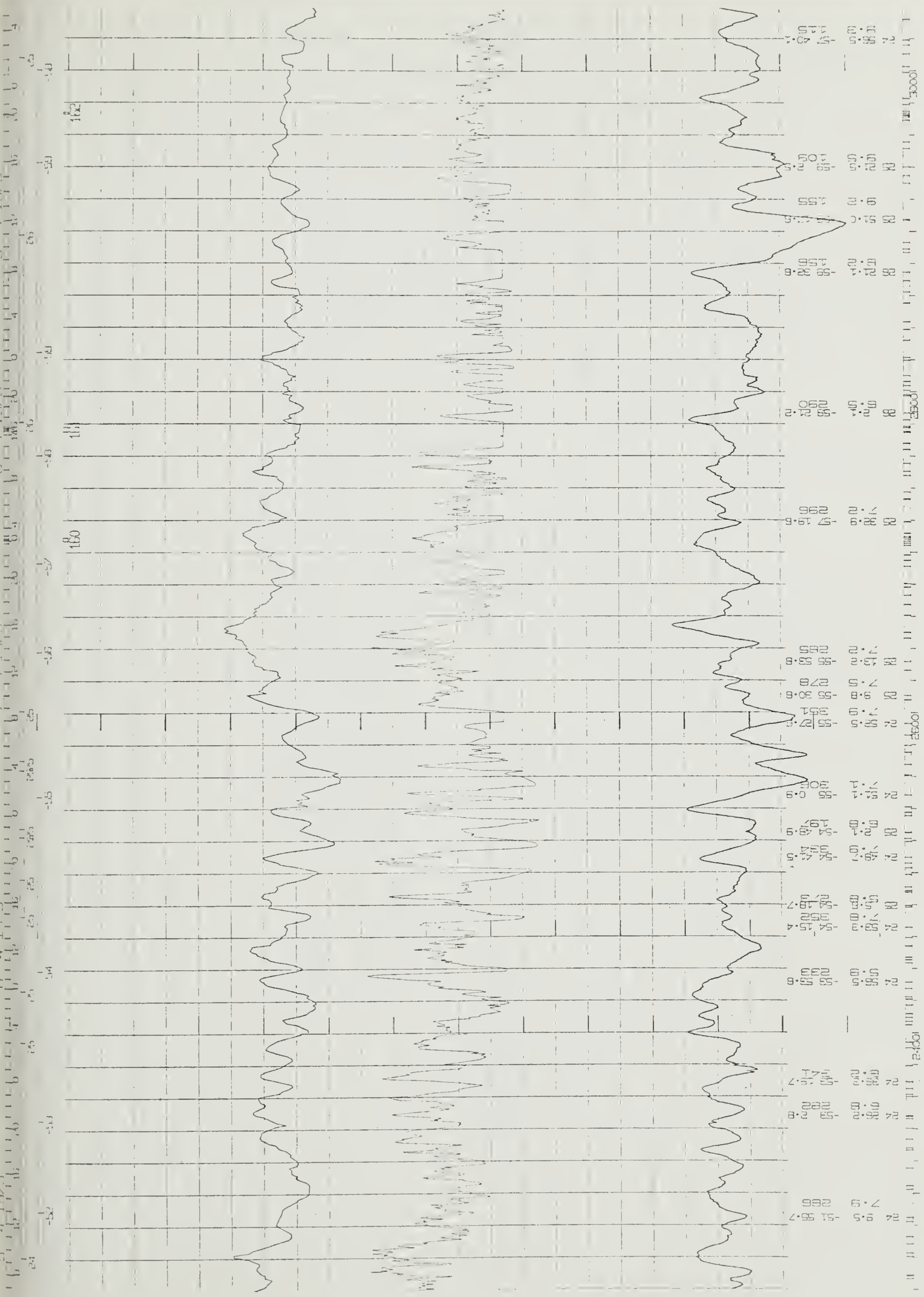
The profiles of topography are plotted at a vertical exaggeration of 100:1. The units of depth used are nominal fathoms (1/400 sec reflection time). Residual geomagnetic anomalies are plotted in gammas (10^5 gammas = 1 oersted). They are obtained by subtracting the regional magnetic field (Cain et al., 1964) from the observations of the total magnetic field. Free-air gravity anomalies are plotted in milligals (1 mgal = 10^{-3} cm/sec^2). The topographic, geomagnetic, and gravity profiles are plotted with respect to distance, which is annotated at intervals of 200 nautical miles near the bottom of each profile. In addition, tick marks shown above the distance scale indicate the distance at which any change in course or speed occurred. The corresponding course and speed between changes and the coordinates at the points of change are annotated above the distance scale listings. Navigational changes which occur too frequently to be annotated in the space available or only minor adjustments in course or speed are indicated only by tick marks. Listings of the entire detailed navigation as well as navigation plots appear in Part A. The course and speed apply to the time interval following each entry.

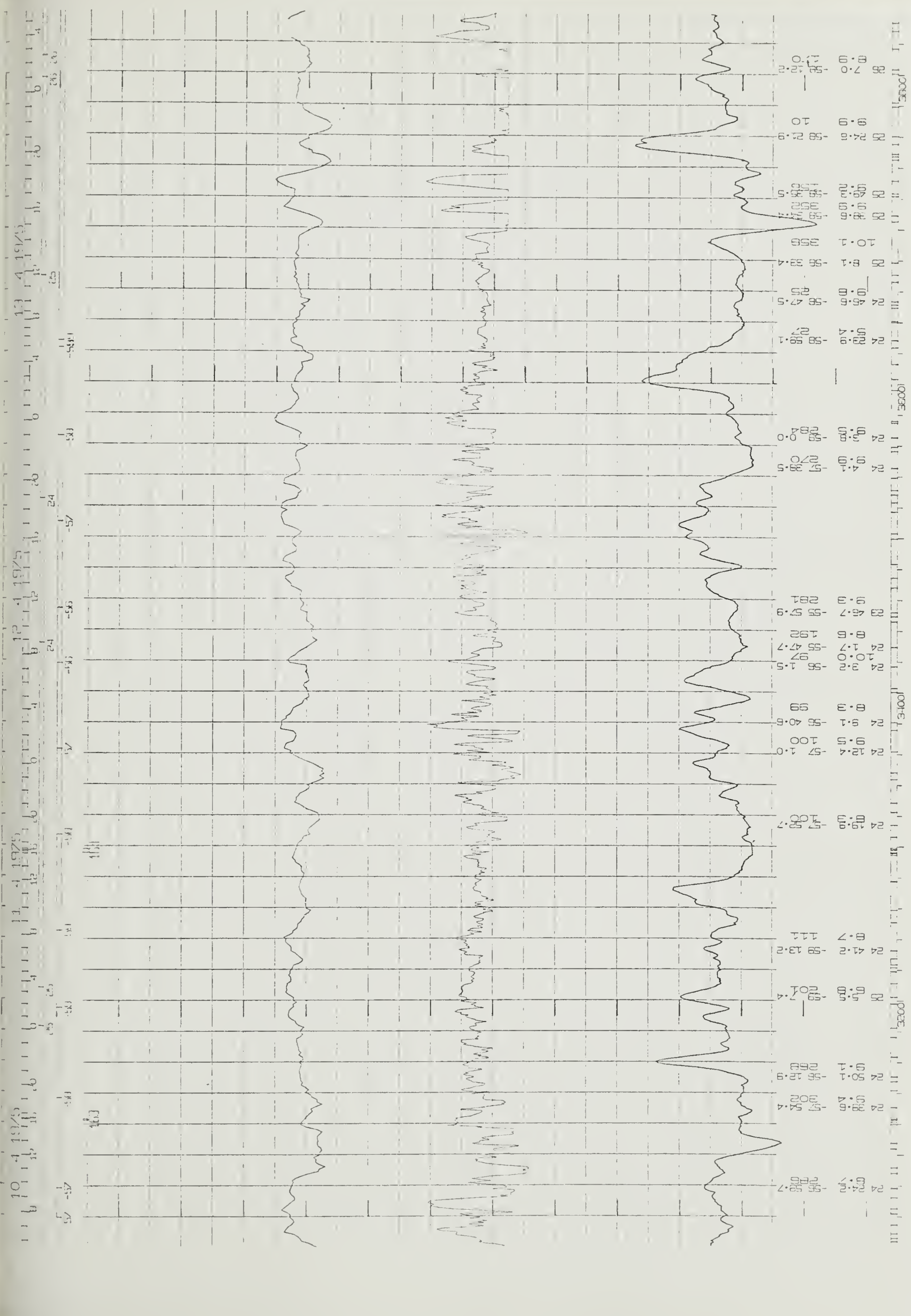


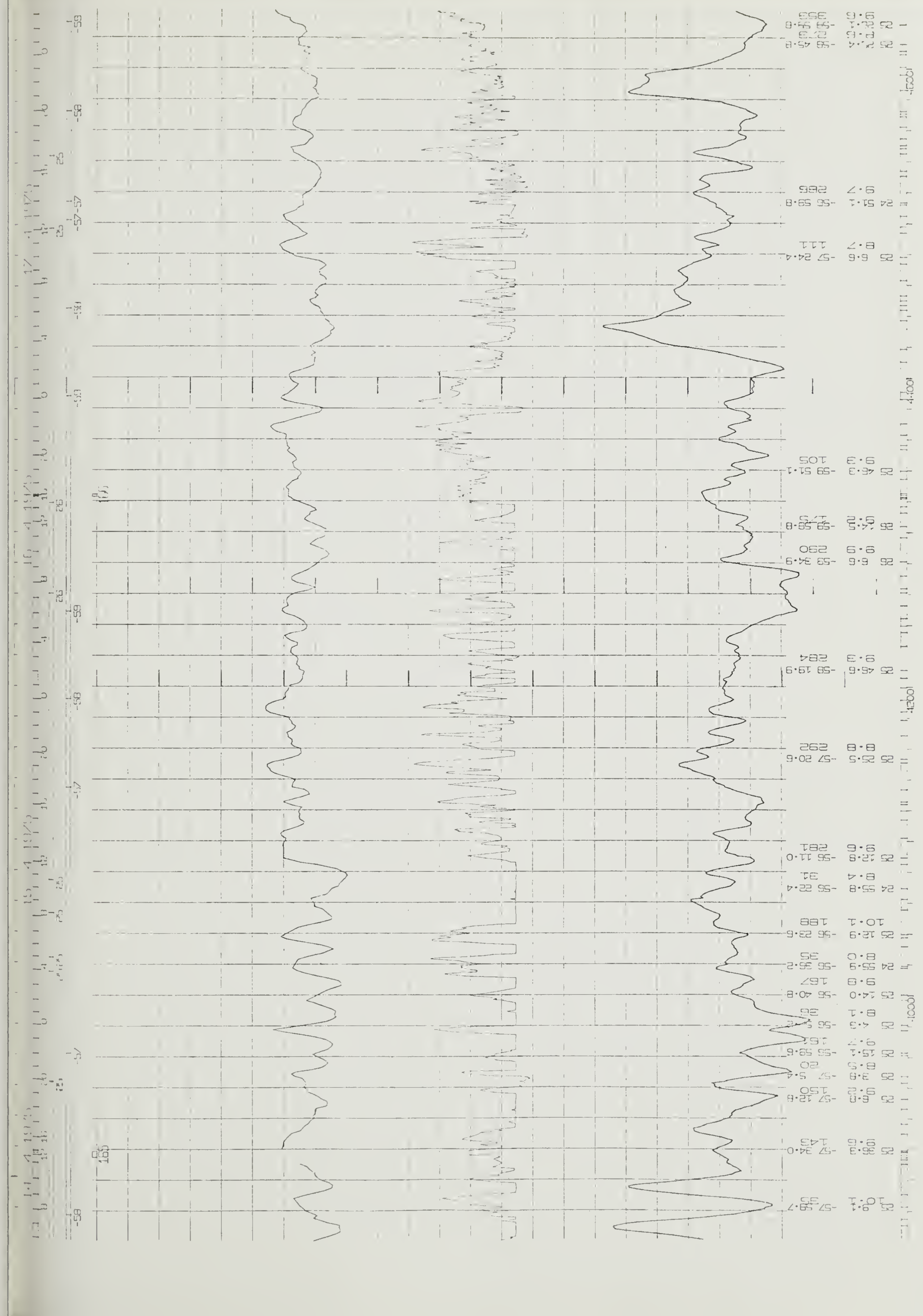
23 3 1975
24 3 1975
25 3 1975
26 3 1975
Gravity
Bathymetry
Magnetics
BRIDGETOWN, BARBADOS


27 3 1975
28 3 1975
29 3 1975
30 3 1975

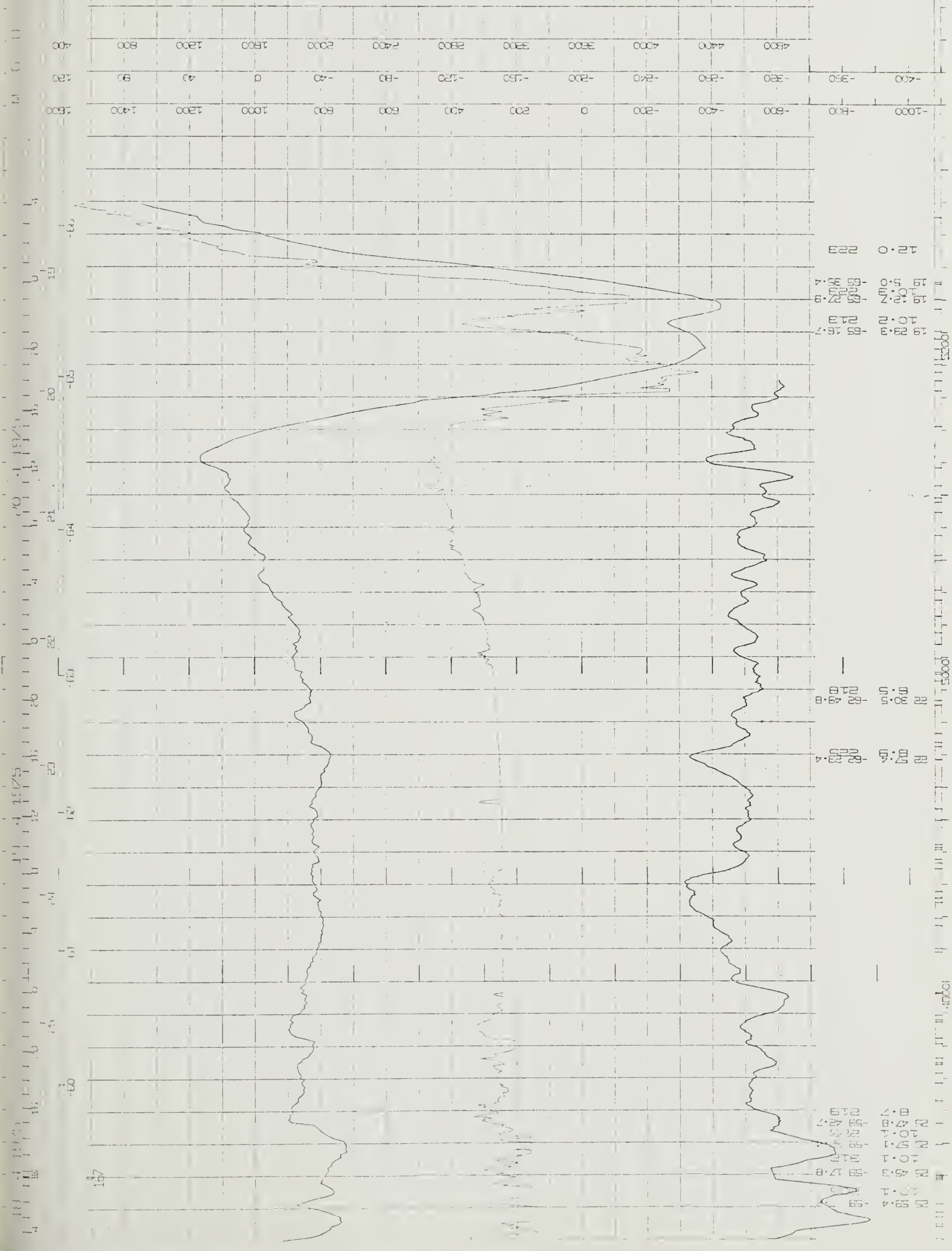








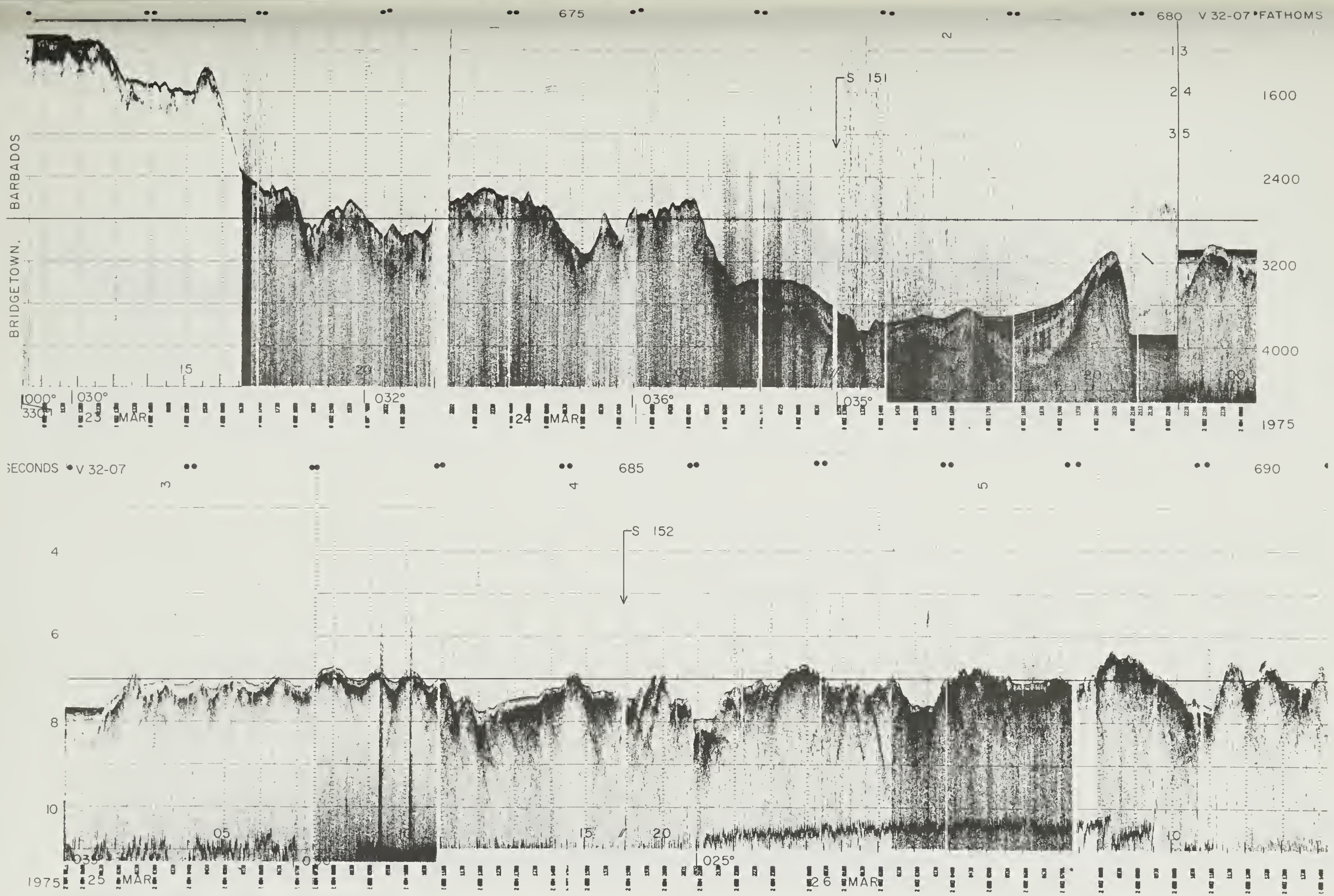
SAN JUAN, PUERTO RICO



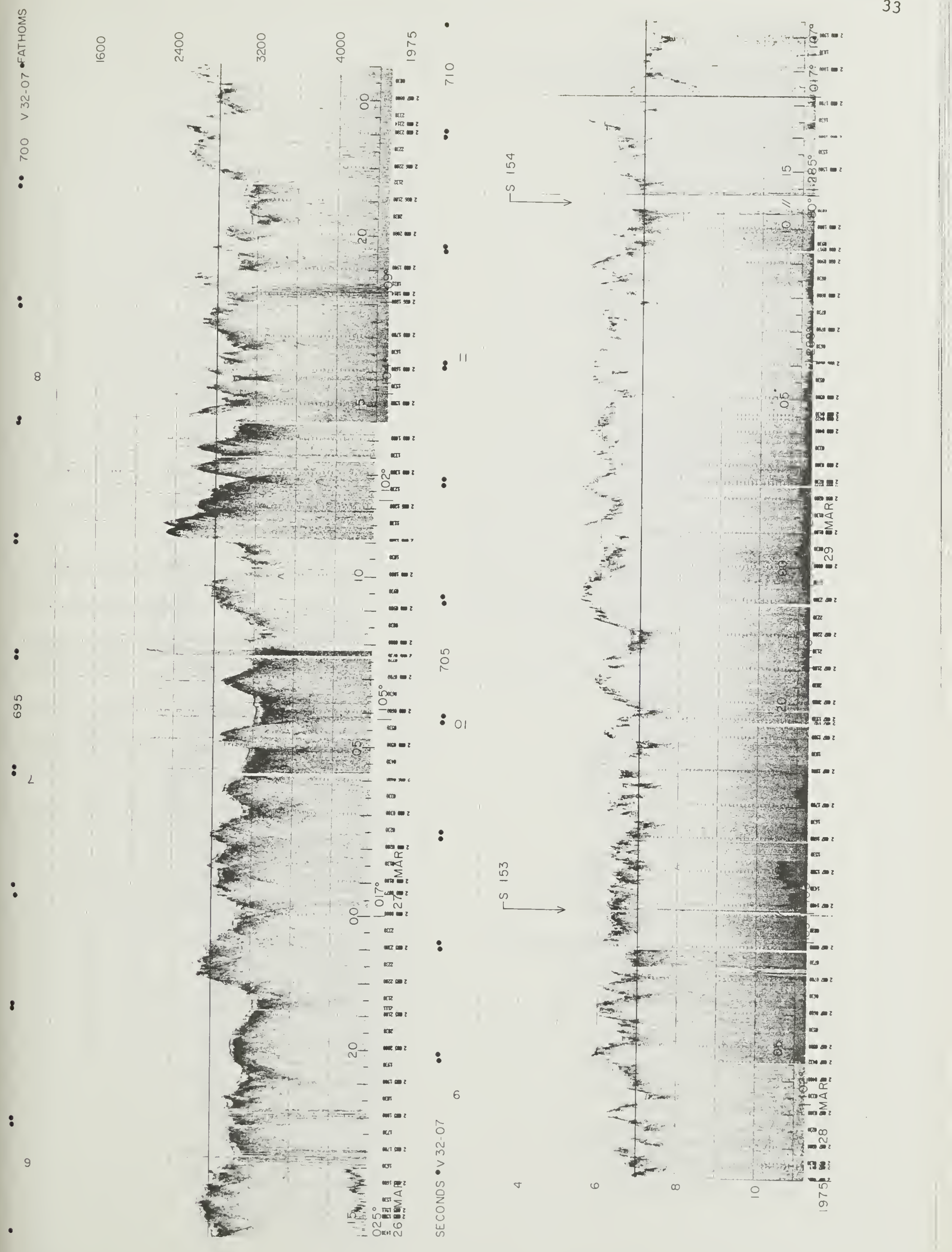
PART C

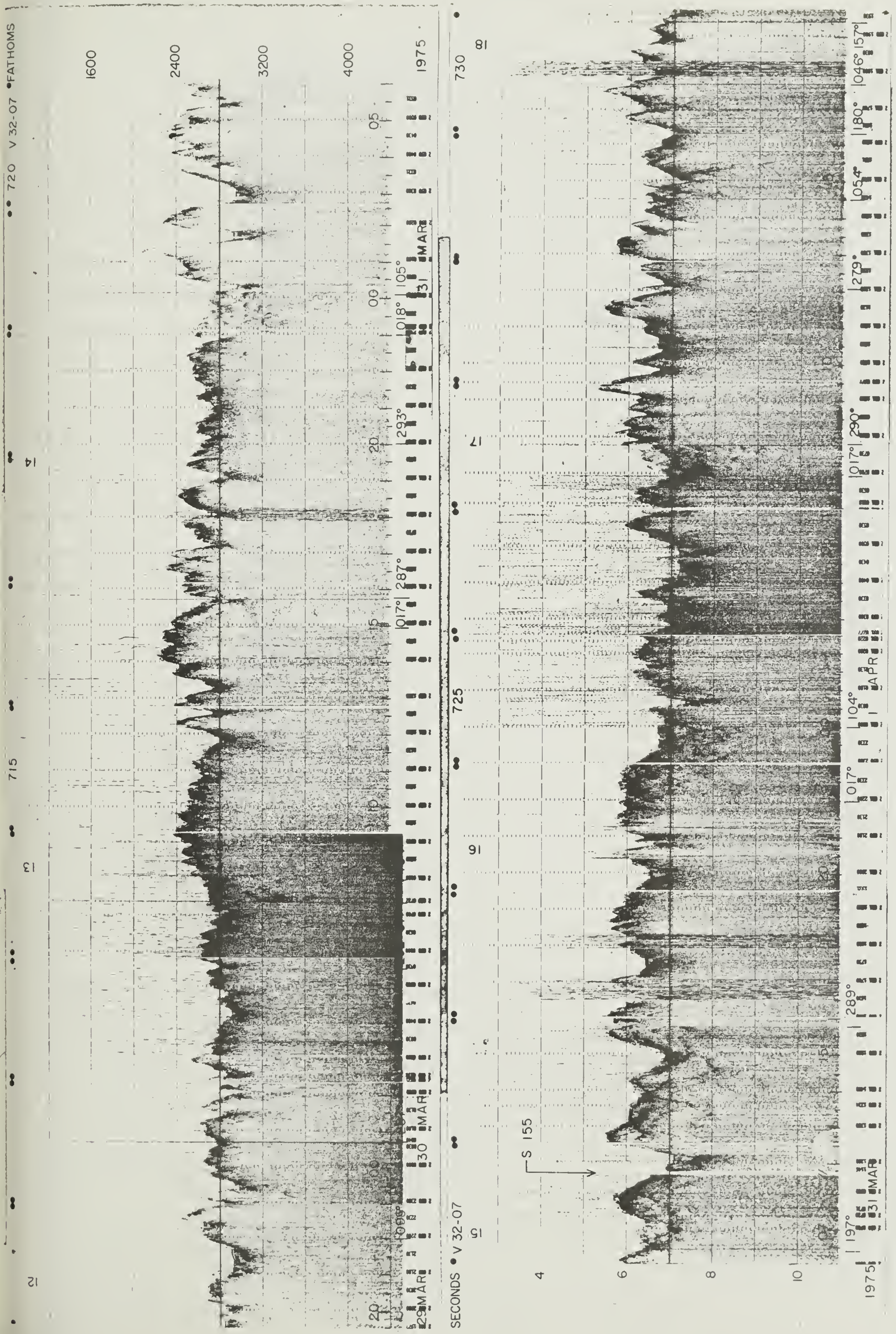
Seismic Reflection Records

Seismic profiler data are presented as reduced copies of the original recordings. The vertical scales on the left side and right side of each page are seconds of two-way reflection time and nominal fathoms. The time of day and ship's heading appear along the bottom of the profiler sections. The courses shown are courses steered as taken from the shipboard logs. These courses generally do not agree precisely with the tabulated navigational data, which are based on the course and speed made good. Hundreds of nautical miles are also annotated on the profiler records. Each fifth profiler sheet number appears at the top of the pages; the intervening sheets are bracketed by two black dots. Major time-breaks in the profiler records are indicated by slanted lines in the lower time scale. The station locations are prefixed by the letter S followed by the station number. Sonobuoy locations are prefixed by the letter R.

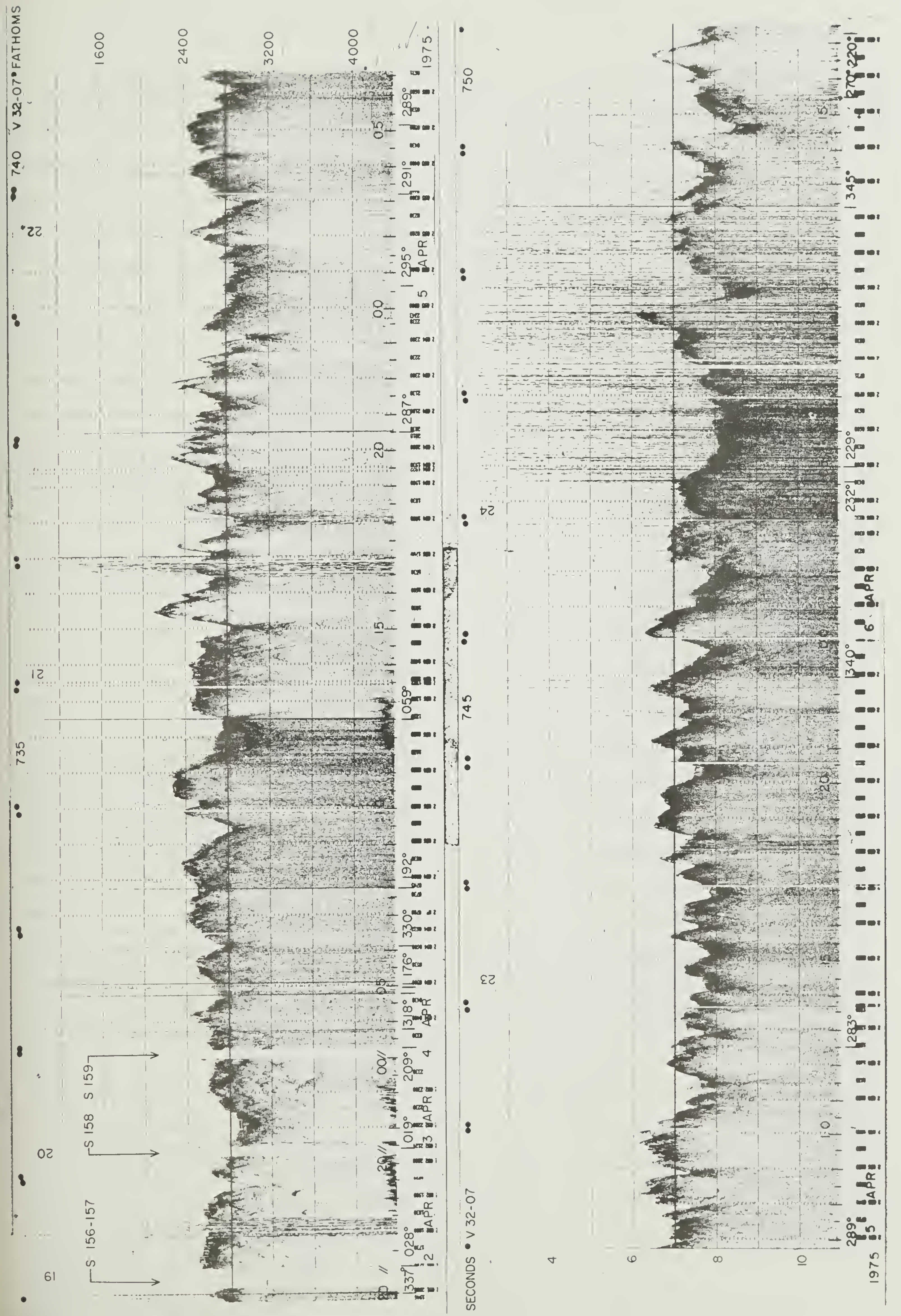


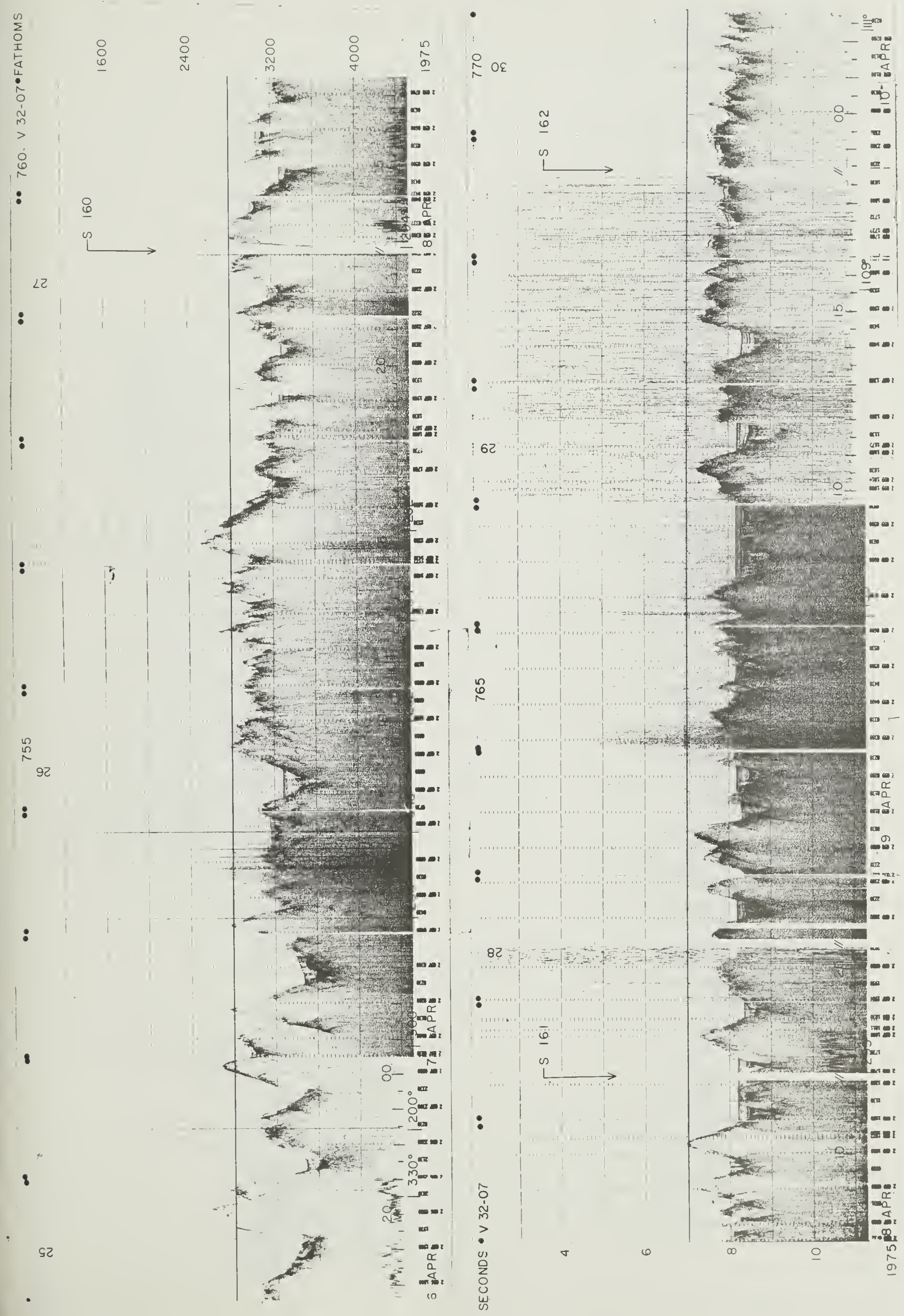
675
680
V 32-07 • FATHOMS
1600
2400
3200
4000
1975
BARBADOS
BRIDGETOWN.
S 151
000°
330°
030°
23 MAR
032°
24 MAR
036°
035°
SECONDS • V 32-07
685
690
S 152
4
6
8
10
25 MAR
025°
26 MAR

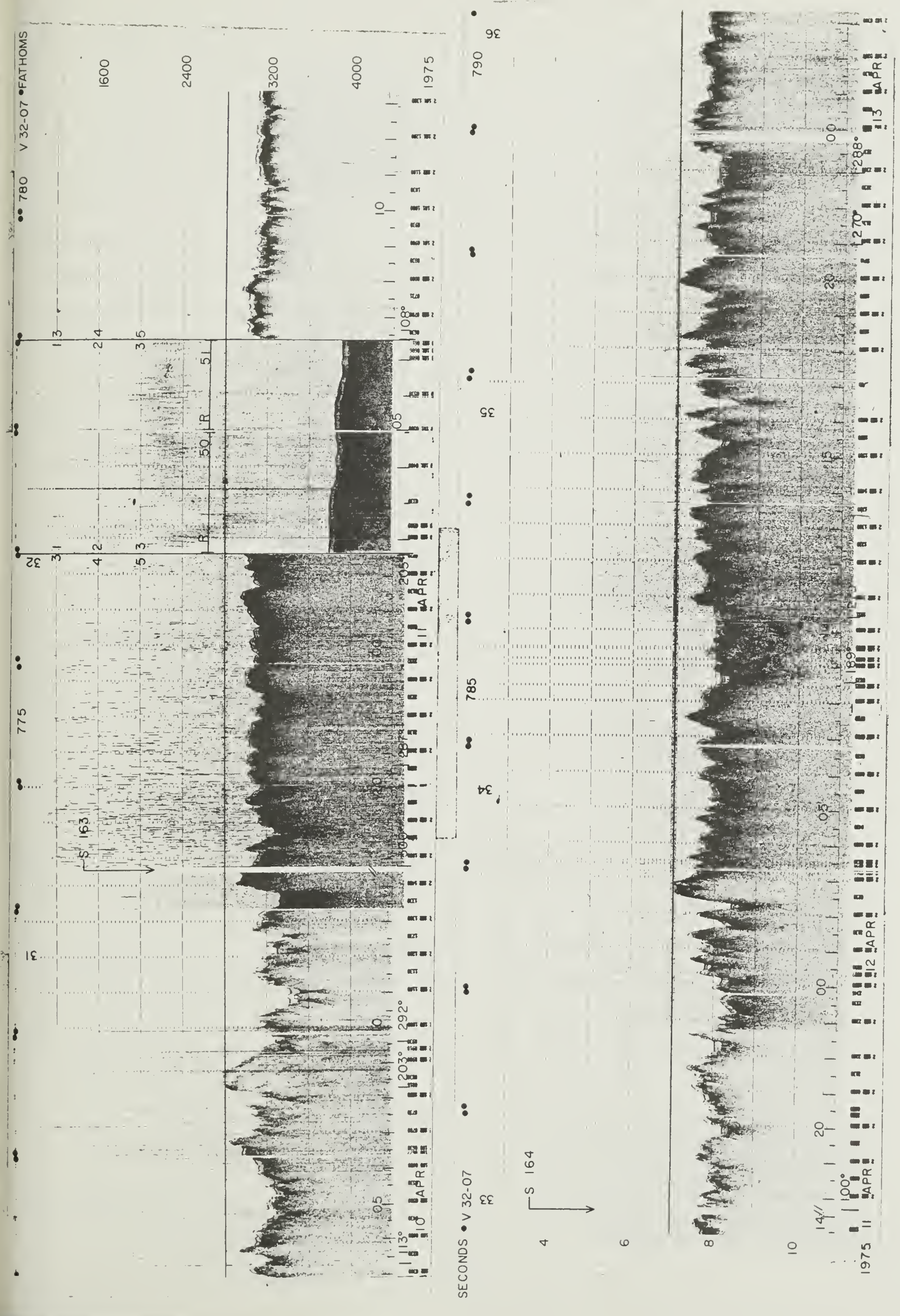

700 V 32-07 FATHOMS
1600
2400
3200
4000
1975
SECONDS V 32-07
26 MAR
27 MAR
S 153
S 154
28 MAR
29 MAR
1975
695
705
710

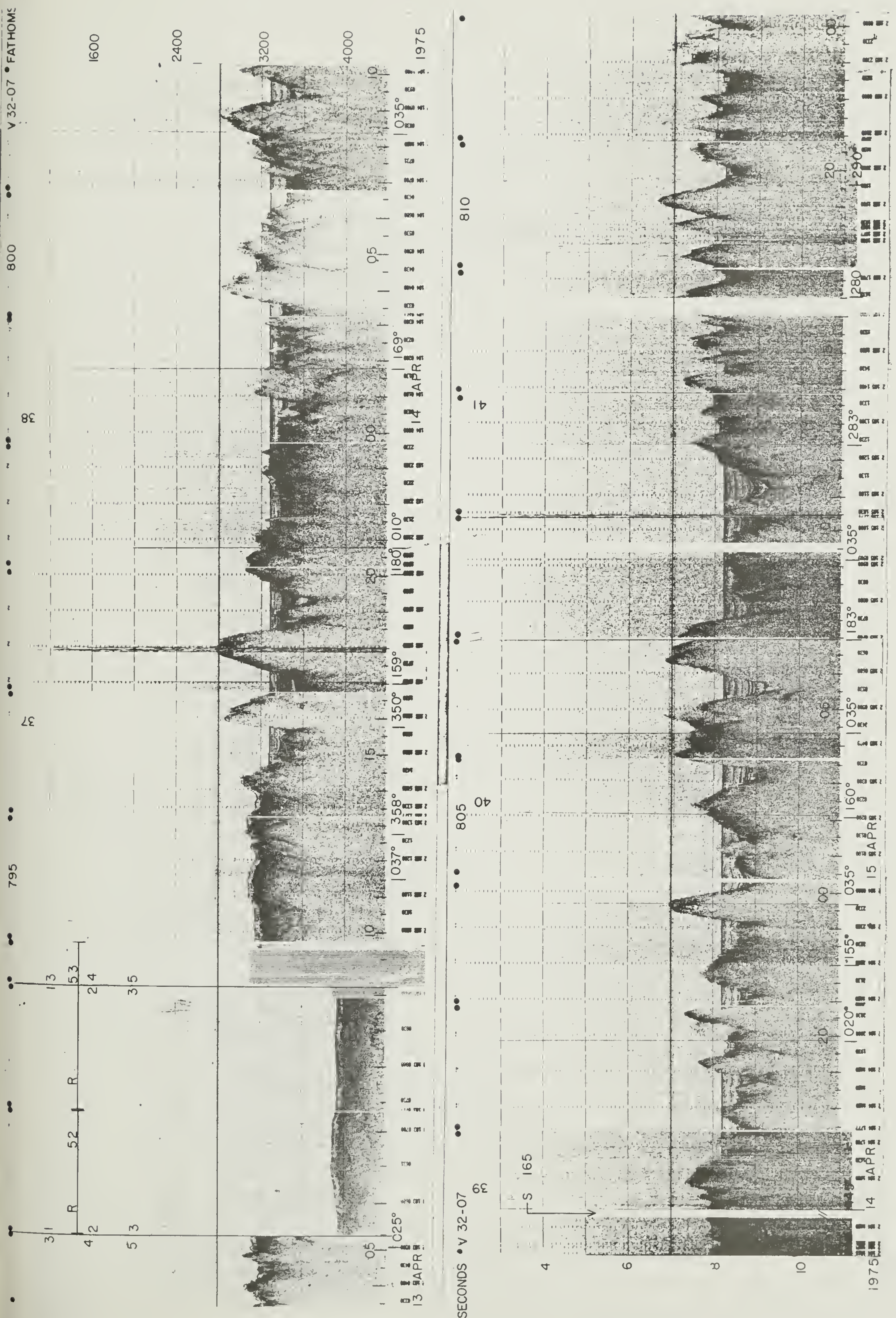


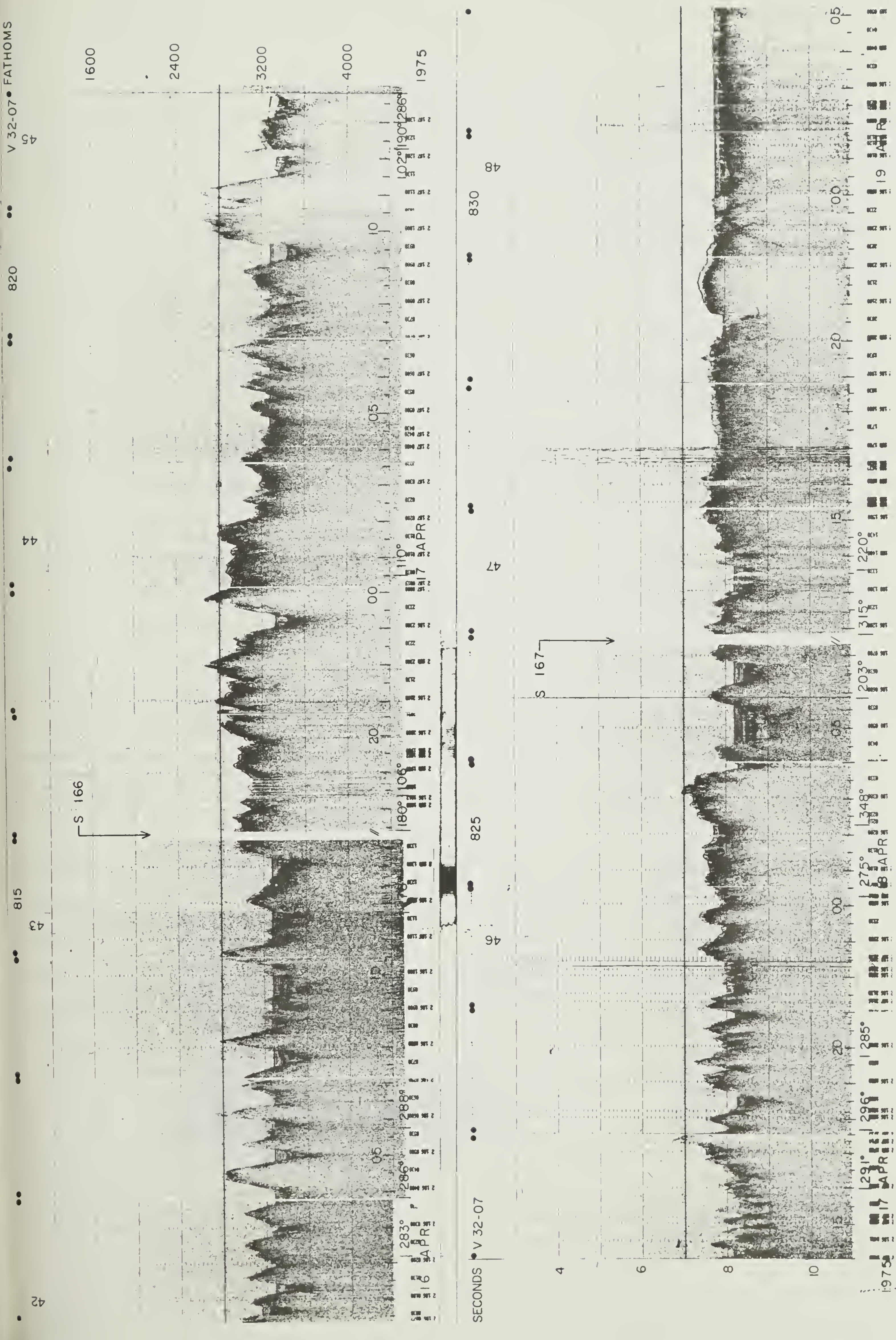
720 V 32-07 FATHOMS
1600
2400
3200
4000
1975
715
725
730
29 MAR
30 MAR
31 MAR
SECONDS V 32-07
S 155
APR
1975


V 32-07 • FATHOMS
1600
2400
3200
4000
1975
SECONDS • V 32-07
4
6
8
10
1975
S 156-157
S 158
S 159
740
735
745
750
APR

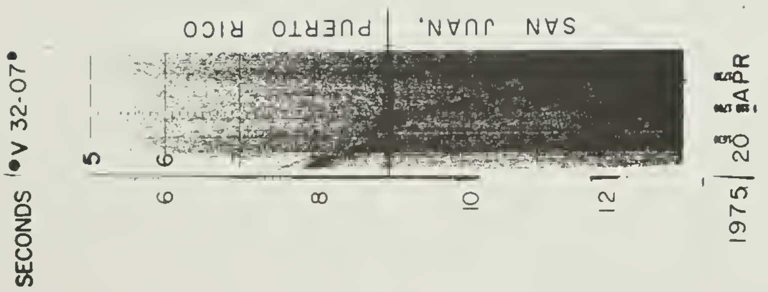

760. V 32-07 • FATHOMS
1600
2400
3200
4000
755
765
770
S 160
S 161
S 162
SECONDS • V 32-07
1975
6 APR
7 APR
8 APR
9 APR
10 APR


V 32-07 •FATHOMS
1600
2400
3200
4000
1975
780
775
785
790
SECONDS • V 32-07
S 163
S 164
APR
292°
203°
113°
100°
270°
288°
189°
108°


V 32-07 • FATHOMS
1600
2400
3200
4000
800
795
805
810
1975
13 APR
14 APR
15 APR
SECONDS • V 32-07
4
6
8
10



V 32-07 FATHOMS
1600
2400
3200
4000
1975
S 166
S 167
SECONDS V 32-07
17 APR
18 APR
19 APR
815
820
825
830


SECONDS
SAN JUAN, PUERTO RICO
1975 20 APR

PART D. SONOBUOY RESULTS

Sonobuoy #50, 25°04.1'N, 59°07.9'N, profiler record #777

V_2	V_3	V_4	V_5	Water Depth	h_2	h_3	h_4
1.80*	4.70	6.25	6.70	5.61	0.28	0.49	1.55

Sonobuoy #51, 24°50.8'N, 59°14.2'W, profiler record #778

V_2	V_3	V_4	Water Depth	h_2	h_3
1.80*	4.75	6.00	5.73	0.21	0.84

Sonobuoy #53, 24°31.3'N, 58°55.0'W, profiler record #793

V_2	V_3	V_4	V_5	Water Depth	h_2	h_3	h_4
1.80*	4.70	6.15	7.10	5.88	0.30	0.60	1.60

* Assumed velocity
velocities (V) in km/sec
thicknesses (h) in km
insufficient data to compute sonobuoy #52

all velocities are unreversed refraction velocities

SECTION II

STATION DATA

Station Index

PART A: Core Descriptions

PART B: Heat Flow Measurements

PART C: Deep-Sea Photography

PART D: Nephelometer Results

VEMA 3207 STATION INDEX

Ship Station	Date	Time Start	Time End	Depth (corr. m) Start	Depth (corr. m) End	N Latitude	W Longitude	C	TG	K	N
151	24 Mar.	0928	1240	5415	5390	15°39.3'	58°28.1'	O.B.S. Test Station			
152	25	1614	1850	5606	5662	19°07.1'	56°24.3'	72	10		
153	28	0915	1341	4693	4774	22°51.5'	50°32.8'	73	11	61	
154	29	1057	1407	5169	5074	23°08.4'	50°23.5'	74	12A	62	
155	31	0845	1139	5097	5159	23°07.3'	49°44.2'	75	12B	63	
156	1-2 Apr.	2148	0045	5161	4973	23°08.1'	50°21.1'	76	12C		
157	2	0414	0651	4958	4726	23°27.2'	50°12.0'	77	12		
158	3	1818	2040	4960	4747	23°27.4'	50°14.0'	78	13		
159	4	0039	0300	4885	5013	23°28.4'	50°12.6'	79	14		
160	7-8	2316	0230	5280	5251	25°28.9'	57°10.7'	80	15	64	32
161	8	1224	1640	6249	6247	25°59.0'	58°13.3'	81	16	65	33
162	9	1912	2215	5817	5903	25°10.6'	58°27.8'	82	17A	66	34
163	10	1439	1736	5627	5637	24°35.8'	57°47.0'	83	17	67	35A
164	11	1415	1730	6034	5900	24°21.5'	58°08.5'	84	18	68	35
165	14	1130	1500	6044	5662	25°36.0'	57°36.8'	85	19	69	36
166	16	1400	1658	5523	5651	25°56.5'	59°57.3'	86	20A	70	37
167	18	0735	1137	5985	5826	25°44.6'	59°15.9'	87	20	71	38

C = Core   TG - Thermograd   K - Camera   N = Nephelometer

Letter suffix denotes equipment malfunction on station - NO DATA

PART A

CORE DESCRIPTIONS - VEMA CRUISE 3207

(Preliminary shipboard descriptions by Dave Pratt)

Date: 25 March 1975

Ship Station No.: 152

Core No: 72

Latitude: 19°07.1'N

Longitude: 56°24.3'W

Depth: 5627 m

Site: Not in site region

Core Length: 1071 cm

0-710 cm

Clay; moderate to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil.

710-1071 cm

Flow-in

Date: 28 March 1975

Ship Station No.: 153

Core No: 73

Latitude: 22°51.5'N

Longitude: 50°32.8'W

Depth: 4749 m

Site: 4

Core Length: 457 cm

0-99 cm

Foraminiferal marl; moderate yellowish brown (10YR5/4). Moist, firm and burrowed. Carbonate content moderate. Coarse fraction 25-30% consisting mainly of benthonic and planktonic foraminifera. Negligible echinoid spines, quartz grains and plant debris. Basal contact a sharp irregular color change. Patches of clay and dark yellowish brown (10YR4/2) are interbedded with this unit. Carbonate content and coarse fraction are nil.

99-118 cm

Marl; Grayish orange (10YR7/4) to moderate yellowish brown (10YR5/4). Moist, firm and burrowed. Carbonate content moderate. Coarse fraction less than 5% consisting mainly of manganese micronodules and planktonic foraminifera. Negligible quartz grains. Basal contact a gradational color change.

118-360 cm

Foraminiferal marl; similar in color composition and texture to unit between 0-99 cm.

360-377 cm

Foraminiferal chalk ooze; Grayish orange (10YR7/4). Moist and firm. Carbonate content high. Coarse fraction about 40% consisting mostly of benthonic and planktonic foraminifera. Occasional manganese micronodules, quartz grains and plant debris. Basal contact a gradational color change.

377-457 cm

Foraminiferal marl; similar in color, composition and texture to unit between 0-99 cm.

Date: 29 March 1975

Ship Station No.: 154

Core No: 74

Latitude: 23°08.4'N

Longitude: 50°23.5'W

Depth: 5171 m

Site: 4

Core Length: 533 cm

0-177 cm

Clay; dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil. Basal contact a sharp color change.

177-182 cm

Chalk; Grayish orange (10YR7/4) to moderate yellowish brown (10YR5/4). Moist and firm. Carbonate content high. Coarse fraction 5-10% consisting mostly of planktonic foraminifera. Frequent fish teeth. Negligible benthonic foraminifera and sub rounded quartz grains. Basal contact a gradational color change.

182-349 cm

Clay; similar in color, composition and texture to unit between 0-177 cm. Basal contact a gradational color and textural change.

349-354 cm

Foraminiferal ooze; Moderate to dark yellowish brown (10YR4/2). Moist and semi-consolidated. Carbonate content high. Coarse fraction about 80% consisting mostly of benthonic and planktonic foraminifera and manganese micro-nodules. Frequent fish teeth. Negligible echinoid spines. Basal contact a gradational color and textural change.

354-533 cm

Interbedded layers of chalk and clay similar to unit between 0-177 cm and 177-182 cm.

Date: 31 March 1975

Ship Station No.: 155

Core No: 75

Latitude: 23°07.3'N

Longitude: 49°44.2'W

Depth: 5143 m

Site: 4

Core Length: 345 cm

0-169 cm

Clay; dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content low. Coarse fraction negligible consisting of planktonic foraminifera. Basal contact a gradational color change.

169-177 cm

Chalk; grayish orange (10YR7/4). Moist, firm and burrowed. Carbonate content moderate to high. Coarse fraction less than 5% consisting mostly of planktonic foraminifera. Negligible manganese micronodules. Basal contact an indistinct color change.

177-345 cm

Clay; moderate to dark yellowish brown (10YR4/2). Similar in composition and texture to unit between 0-169 cm.

Date: 1-2 April 1975

Ship Station No.: 156

Core No: 76

Latitude: 23°08.1'N

Longitude: 50°21.1'W

Depth: 5080 m

Site: 4

Core Length: 471 cm

0-73 cm

Clay; moderate yellowish brown (10YR5/4) to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content very low. Coarse fraction less than 5% consisting mostly of planktonic foraminifera. Negligible benthonic foraminifera and manganese micronodules. Basal contact a sharp, irregular color change.

73-77 cm

Chalk; grayish orange (10YR7/4). Moist and firm. Carbonate content moderate to high. Coarse fraction 5-10% consisting mainly of benthonic and planktonic foraminifera. Negligible sub angular quartz grains and manganese micronodules. Basal contact a gradational color change.

77-210 cm

Clay; similar to unit between 0-73 cm.

210-220 cm

Chalk; similar to unit between 73-77 cm.

220-307 cm

Clay

307-390 cm

Foraminiferal chalk ooze; grayish orange (10YR7/4). Moist and firm. Carbonate content high. Coarse fraction about 40% consisting mainly of benthonic and planktonic foraminifera.

398-471 cm

Interbedded layers of chalk and clay similar to previous units.

Date: 2 April 1975

Ship Station No.: 157

Core No: 77

Latitude: 23°27.2'N

Longitude: 50°12.0'W

Depth: 4918 m

Site: 4

Core Length: 412 cm

0-124 cm

Clay; grayish orange (10YR7/4) to moderate yellowish brown (10YR5/4) to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content very low. Coarse fraction 5-10% consisting mainly of benthonic and planktonic foraminifera. Negligible sub angular quartz grains, fish teeth and manganese micronodules. Basal contact an indistinct gradational color change.

124-147 cm

Foraminiferal chalk; grayish orange (10YR7/4). Moist and firm. Carbonate content high. Coarse fraction about 25% consisting mostly of benthonic and planktonic foraminifera. Negligible echinoid spines and fish teeth. Basal contact a gradational color change.

147-412 cm

Interbedded layers of clay and foraminiferal chalk; similar to above units.

Date: 3 April 1975

Ship Station No.: 158

Core No: 78

Latitude: 23°27.4'N

Longitude: 50°14.0'W

Depth: 4914 m

Site: 4

Core Length: 309 cm

0-120 cm

Clay; moderate to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content low. Coarse fraction less than 5% consisting mostly of benthonic and planktonic foraminifera. Negligible fish teeth and manganese micronodules. Basal contact a gradational color change.

120-142 cm

Chalk; grayish orange (10YR7/4) to moderate yellowish brown (10YR5/4). Moist and firm. Carbonate content moderate to high. Coarse fraction less than 5% consisting mostly of benthonic and planktonic foraminifera. Basal contact a gradational color change.

142-270 cm

Clay; similar to unit between 0-120 cm.

270-307 cm

Chalk; similar to unit between 120-142 cm.

307-309 cm

Clay

Date: 4 April 1975

Ship Station No.: 159

Core No: 79

Latitude: 23°28.4'N

Longitude: 50°12.6'W

Depth: 4914 m

Site: 4

Core Length: 263 cm

<u>0-263 cm</u>

<u>Foraminiferal marl</u>; grayish orange (10YR7/4) to moderate yellowish brown (10YR5/4) to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content low to moderate. Coarse fraction about 10% consisting mainly of benthonic and planktonic foraminifera. Frequent manganese micronodules. Negligible quartz grains. Size of manganese nodules increases with depth up to about 147 cm. At this depth, coarse fraction is all manganese. Below 147 cm there are no manganese micronodules. From 147-263 cm may be flow in, but too soupy to determine.

Date: 8 April 1975

Ship Station No.: 160

Core No: 80

Latitude: 25°28.9'N

Longitude: 57°10.7'W

Depth: 5300 m

Site: 3

Core Length: 325 cm

0-240 cm

Clay; moderate to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content very low. Coarse fraction nil. Basal contact a gradational color change.

240-250 cm

Foraminiferal marl; grayish orange (10YR7/4) to moderate yellowish brown (10YR5/4). Moist, firm and burrowed. Carbonate content moderate. Coarse fraction about 10% consisting mostly of benthonic and planktonic foraminifera. Occasional manganese micronodules. Basal contact a gradational color change.

250-325 cm

Clay; similar in color, composition and texture to unit between 0-240 cm.

Date: 8 April 1975

Ship Station No.: 161

Core No: 81

Latitude: 25°59.0'N

Longitude: 58°13.3'W

Depth: 6249 m

Site: 3

Core Length: 323 cm

0-60 cm

Clay; pale yellowish brown (10YR6/2) to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil. Basal contact a very sharp color change.

60-323 cm

Clay; olive green (5Y4/1). Moist and firm. Carbonate content nil. Coarse fraction nil.

Date: 9 April 1975

Ship Station No.: 162

Core No: 82

Latitude: 25°10.6'N

Longitude: 58°27.8'W

Depth: 5885 m

Site: 3

Core Length: 582 cm

0-582 cm

Clay; moderate to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil.

Date: 10 April 1975

Ship Station No.: 163

Core No: 83

Latitude: 24°35.8'N

Longitude: 57°47.0'W

Depth: 5610 m

Site: 3

Core Length: 460 cm

0-460 cm

Clay; moderate yellowish brown (10YR5/4) to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil.

Date: 11 April 1975

Ship Station No.: 164

Core No: 84

Latitude: 24°21.5'N

Longitude: 58°08.5'W

Depth: 6034 m

Site: 3

Core Length: 404 cm

0-348 cm

Clay; dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil. Basal contact a sharp color and textural change. Several large manganese nodules are scattered throughout this layer.

348-353 cm

Manganese crust; black (N-1). Very firm. Basal contact a sharp color and textural change.

353-404 cm

Clay; moderate reddish orange (10YR6/6) to light brown (5YR5/6). Moist and firm. Carbonate content nil. Coarse fraction negligible consisting of fish teeth; manganese micronodules and quartz grains. A large manganese nodule is present at the bottom of the core. It appears to be formed around a piece of highly weathered igneous rock; perhaps basement material. This may be so as the cutting edge was folded and crumpled and a very hard pullout was experienced. Sediment cover in the area was very thin.

Date: 14 April 1975

Ship Station No.: 165

Core No: 85

Latitude: 25°36.0'N

Longitude: 57°36.8'W

Depth: 5850 m

Site: 3

Core Length: 323 cm

0-323 cm

Clay; moderate to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content very low. Coarse fraction nil.

Date: 16 April 1975

Ship Station No.: 166

Core No: 86

Latitude: 25°56.5'N

Longitude: 59°57.3'W

Depth: 5570 m

Site: 3

Core Length: 1138 cm

0-1138 cm

Clay; dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil.

There is most certainly flow-in present in this core; but due to its homogeneous composition, it is not possible to ascertain its beginning.

Date: 18 April 1975

Ship Station No.: 167

Core No: 87

Latitude: 25°44.6'N

Longitude: 59°15.9'W

Depth: 5820 m

Site: 3

Core Length: 823 cm

0-823 cm

Clay; moderate to dark yellowish brown (10YR4/2). Moist, firm and burrowed. Carbonate content nil. Coarse fraction nil. An occasional manganese nodule is present in the core.

PART B

Heat Flow Measurements

Compiled By: Lois K. Ongley and Marcus G. Langseth

The following pages show the geothermal data for each heat flow station taken durning R/V VEMA cruise 32, leg The data are presented both graphically and in tabular form.

The graphs show Temperature Difference (T_{sed}-T_{H_2O}) and Thermal Conductivity versus Depth of Penetration in the sediment.

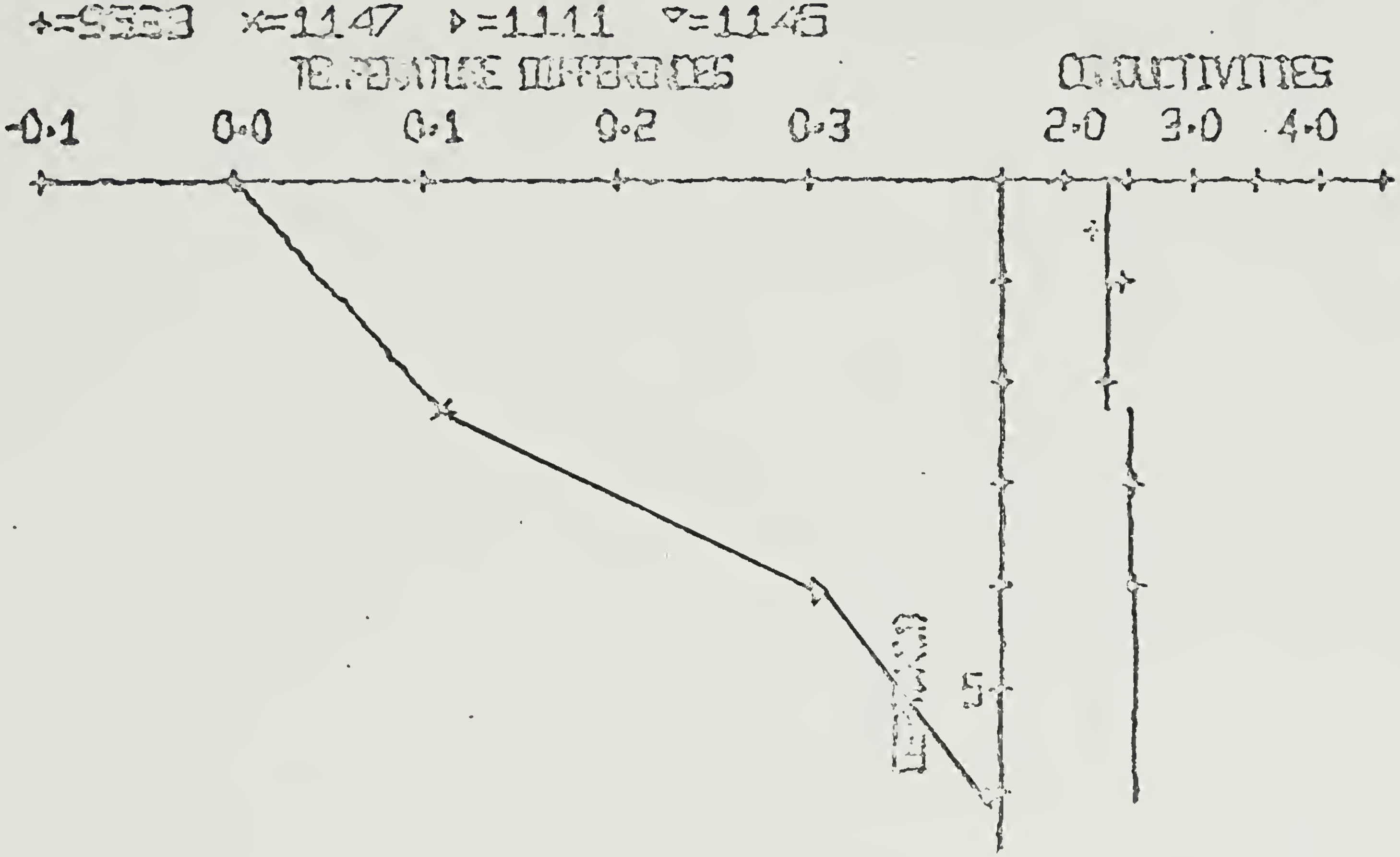
There are two tables for each station. The first shows the depth of penetration, temperature difference and the standard error associated with this temperature difference for each probe. The calculated bottom water temperature is given.

The second table is a gradient and standard error matrix. The values are arranged as follows:

PROBE 1	PROBE 2	PROBE 3	PROBE 4
*********	gradient(2-1)	gradient(3-1)	gradient(4-1)
********	stan. err.	stan. err.	stan. err.
*********	*********	gradient(3-2)	gradient(4-2)
********	********	stan. err.	stan. err.
*********	*********	*********	gradient(4-3)
********	********	********	stan. err.

The gradient chosen for heat flow calculations is underlined or oted separately. Where the temperature differences were not calulated by computer (V32-011) there are no standard error calculations.

TGRAD STATION V32-011 28MAR 75



EQUILIBRIUM TEMPERATURE DIFFERENTIAL ESTIMATES

PROBE NO.	DEPTH(M)	DFLT(C)	STAN.ERR.
9538	0.00	0.000	0.0117
1147	2.25	0.109	0.0002
1111	4.05	0.306	0.0009
1145	6.10	0.395	0.0009

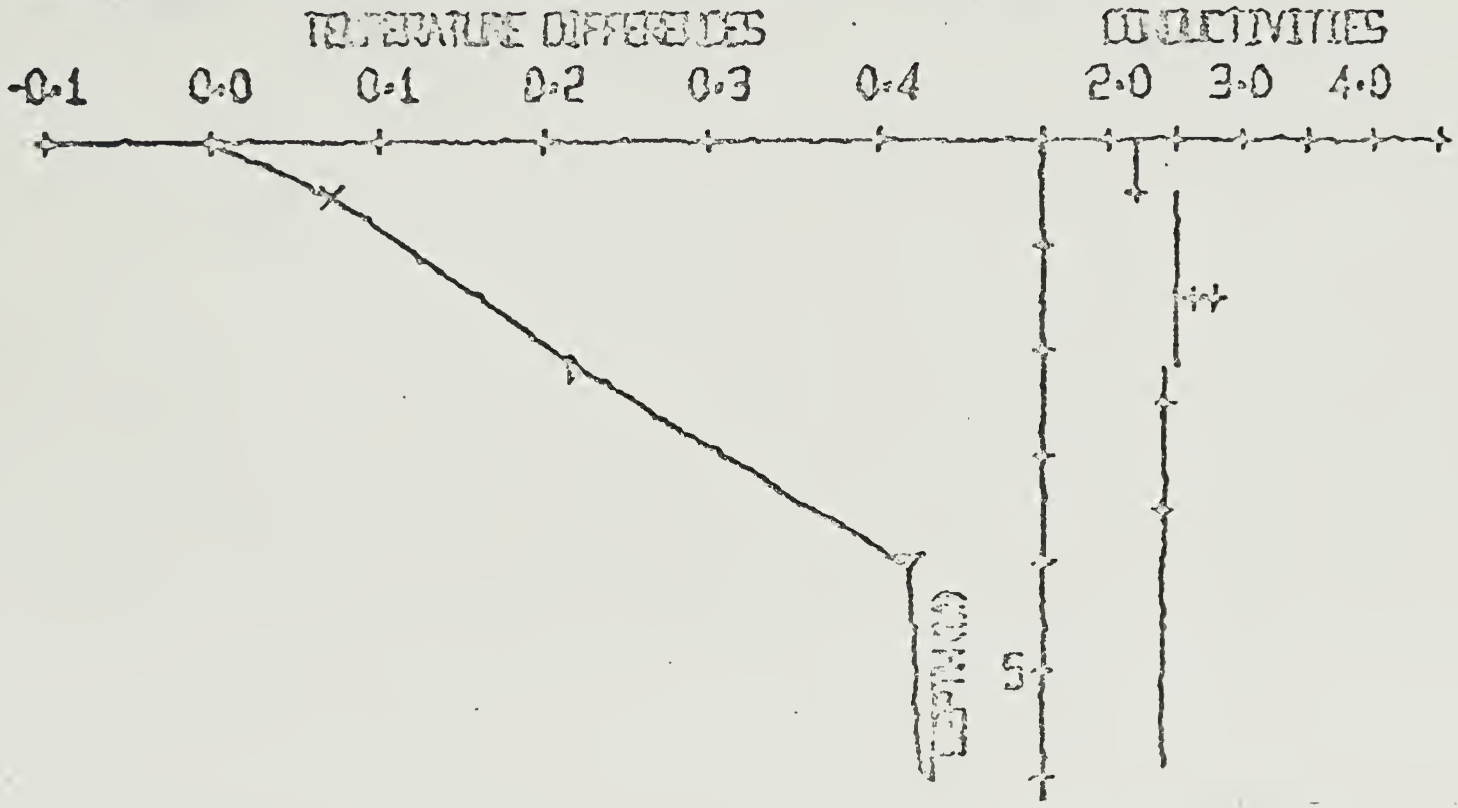
GRADIENTS AND STANDARD ERRORS (C/m)

	1	2	3	4
1	******	0.0483	0.0756	0.0647
2	[illegible]	******	[illegible]	[illegible]
3	[illegible]	******	[illegible]	[illegible]

[illegible] IS 2.04

TGRAD STATION V32-012 02APR 75

+=9533 x=1147 ▷=1157 ▽=1111 ◁=1145



EQUILIBRIUM TEMPERATURE DIFFERENTIAL ESTIMATES

PROBE NO.	DEPTH(M)	DELT(C)	STAN.ERR.
9533	0.00	0.000	0.008
1147	0.53	0.072	0.006
1157	2.17	0.222	0.004
1111	4.05	0.420	0.006
1145	5.92	0.426	0.009

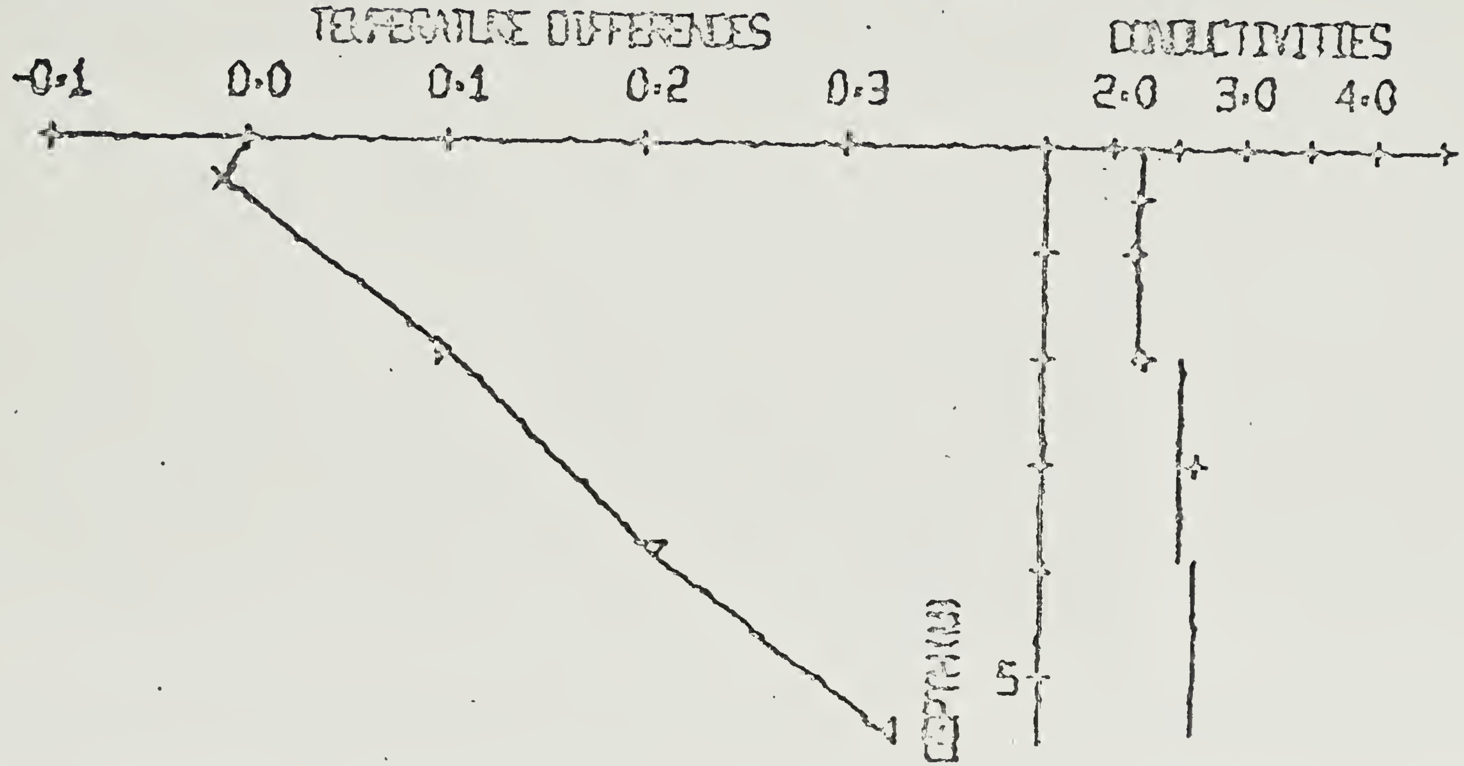
THE BOTTOM WATER TEMPERATURE IS [illegible]

GRADIENTS AND STANDARD ERRORS (C/m)

	1	2	3	4	5
1	******	0.1367	0.1023	0.1036	0.0719
	*****	0.0195	0.0042	0.0024	0.0020
2	******	*******	0.0911	[illegible]	0.0655
	*****	******	[illegible]	0.0025	0.0020
3	******	*******	*******	0.1051	0.0544
	*****	******	******	0.0039	0.0026
4	******	*******	*******	*******	0.0033
	*****	******	******	******	0.00

TGRAD STATION V32-013 03APR 75

+=9538 x=1147 ▷=1157 ▽=1111 ⊲=1145



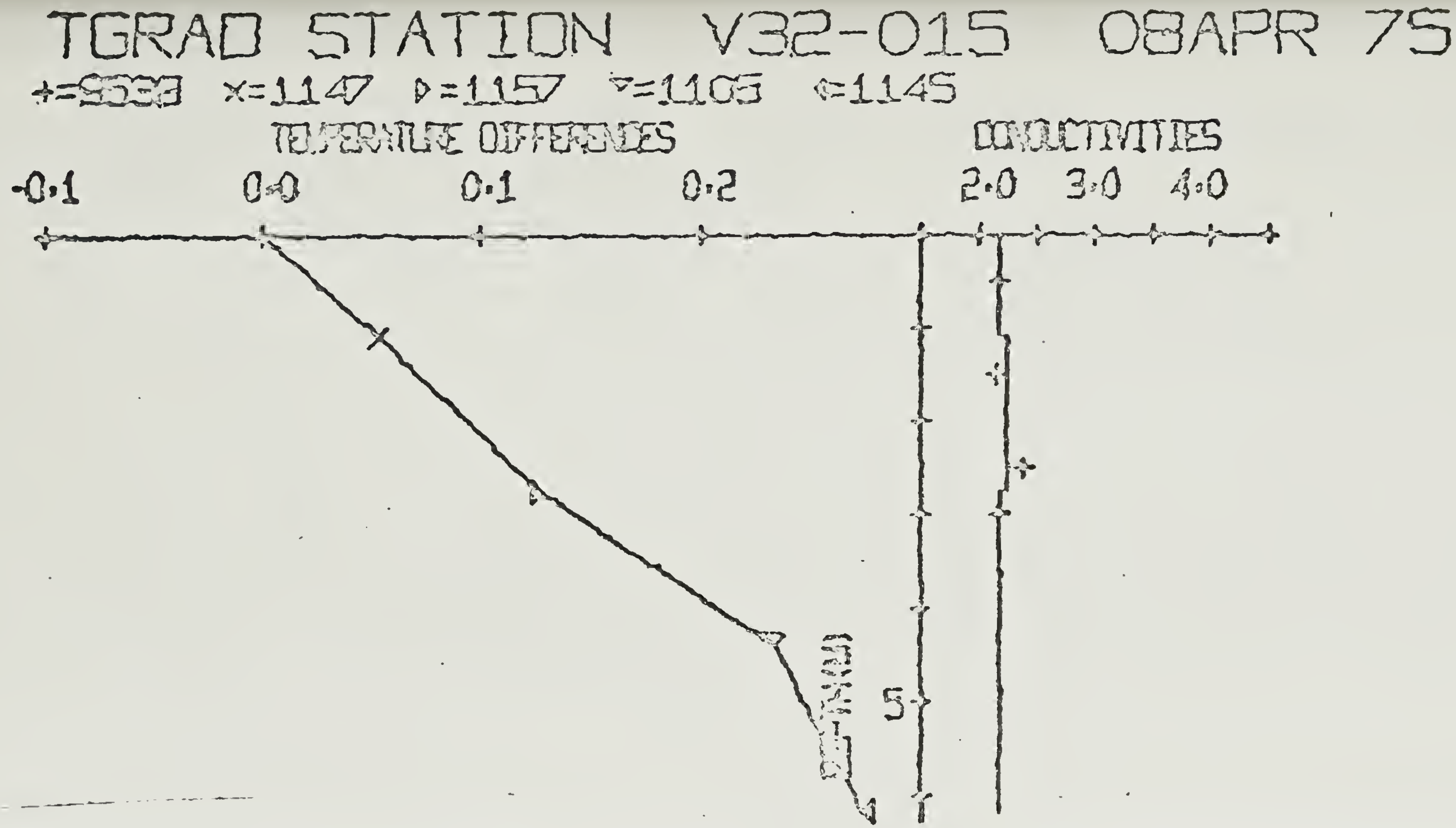
EQUILIBRIUM TEMPERATURE DIFFERENTIAL ESTIMATES

PROBE NO.	DEPTH(M)	DELT(C)	STAN.ERR.
9538	0.00	0.000	0.0048
1147	0.41	-0.012	0.0042
1157	2.01	0.102	0.0042
1111	3.90	0.207	0.0127
1145	5.52	0.323	0.0040

THE BOTTOM WATER TEMPERATURE IS 2.20

GRADIENTS AND STANDARD ERRORS (C/m)

	1	2	3	4	5
1	******	-0.0287	0.0506	0.0531	0.0584
	*****	0.0156	0.0032	0.0034	0.0011
2	******	*******	0.0710	0.0628	0.0654
	*****	******	0.0037	0.0038	0.0011
3	******	*******	*******	0.0558	0.0629
	*****	******	******	0.0071	0.0016
4	******	*******	*******	*******	0.0711
	*****	******	******	******	0.0032



EQUILIBRIUM TEMPERATURE DIFFERENTIAL ESTIMATES

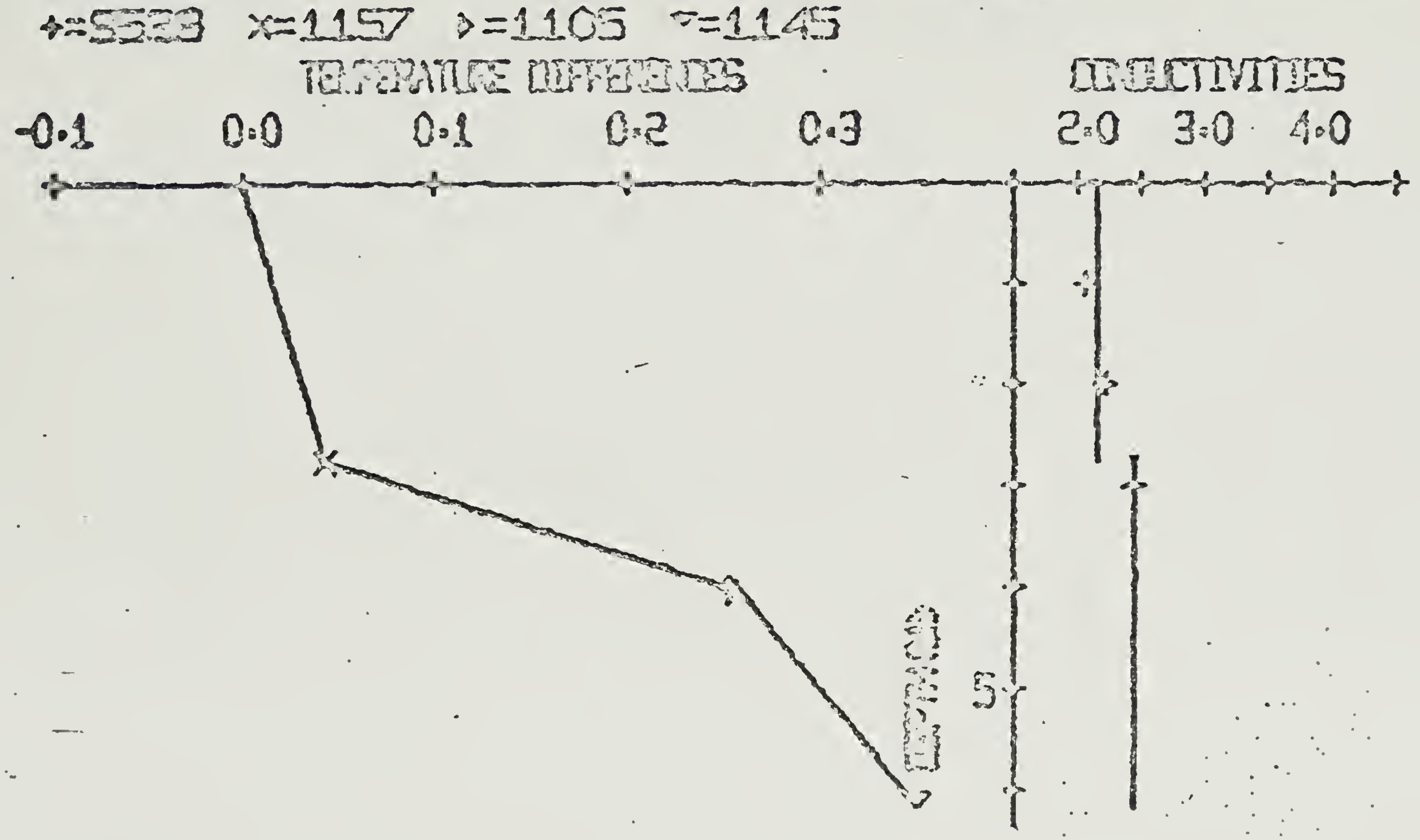
PROBE NO.	DEPTH(M)	DELT(C)	STAN. ERR.
9538	0.00	0.000	0.0042
1147	1.09	0.054	0.0108
1157	2.76	0.128	0.0105
1105	4.41	0.233	0.0101
1145	6.16	0.2740	0.0078

THE BOTTOM WATER TEMPERATURE IS 1.96

GRADIENTS AND STANDARD ERRORS

	1	2	3	4	5
1	******	0.0494	0.0463	0.0529	0.0444
	*****	0.0106	0.0041	0.0024	0.0014
2	******	*******	0.0443	0.0540	0.0434
	*****	******	0.0090	0.0044	0.0026
3	******	*******	*******	0.0638	0.0429
	*****	******	******	0.0088	0.0038
4	******	*******	*******	*******	0.0232
	*****	******	******	******	0.0073

TGRAD STATION V32-016 08APR 75



EQUILIBRIUM TEMPERATURE DIFFERENTIAL ESTIMATES

PROBE NO.	DEPTH(M)	DELT(C)	STAN.ERR.
9538	0.00	0.000	0.0060
1157	2.76	0.043	0.0098
1105	4.05	0.259	0.0096
1145	6.17	0.350	0.0065

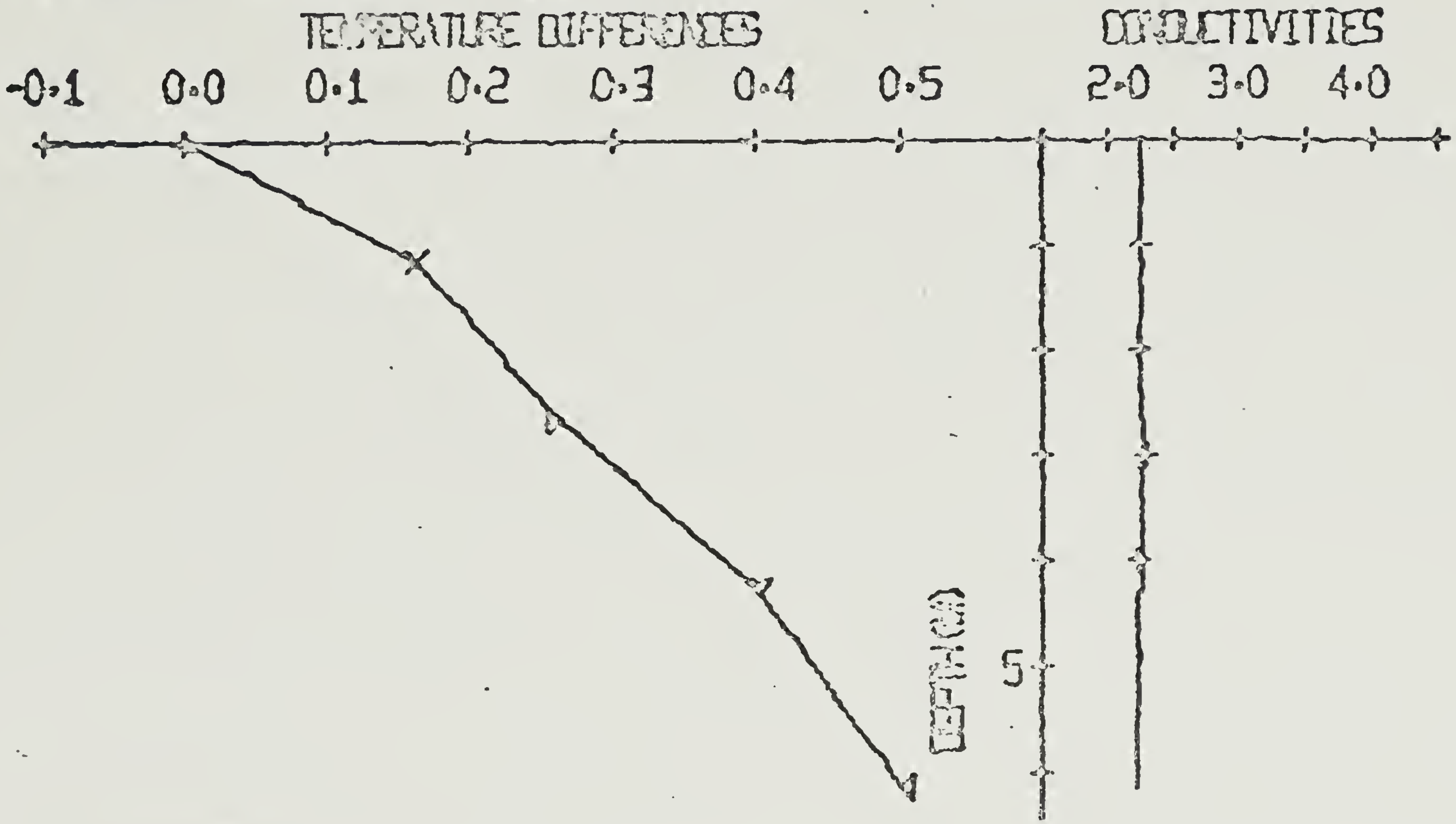
THE BOTTOM WATER TEMPERATURE IS 2.17

GRADIENTS AND STANDARD ERRORS (C/m)

	1	2	3	4
1	******	0.0155	0.0638	0.0567
	*****	0.0041	0.0028	0.0014
2	******	*******	0.1673	0.0901
	*****	******	0.0106	0.0034
3	******	*******	*******	0.0431
	*****	******	******	0.0054

TGRAD STATION V32-017 10APR 75

+=9538 x=1111 ▷=1157 ▽=1105 ◁=1145



EQUILIBRIUM TEMPERATURE DIFFERENTIAL ESTIMATES

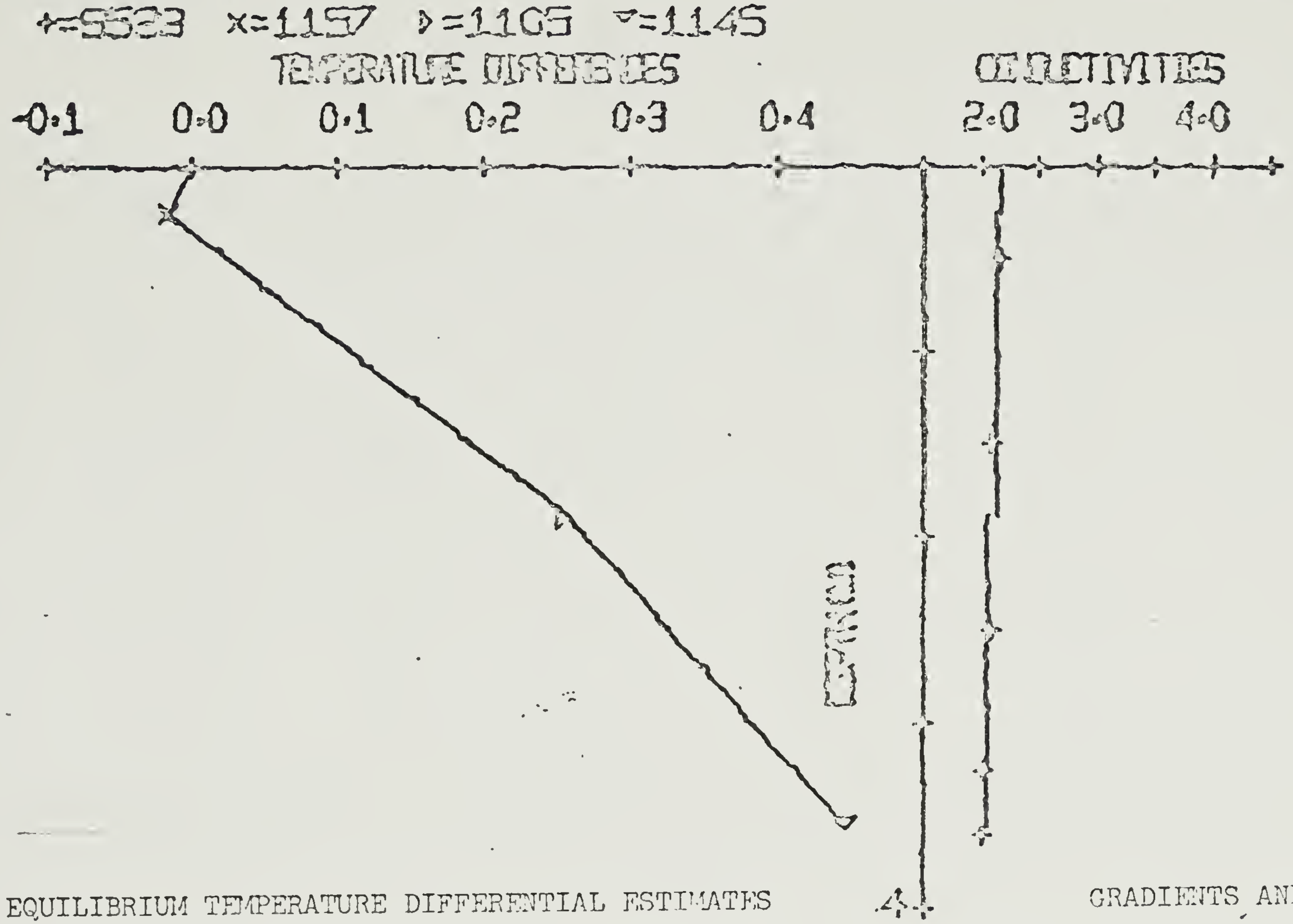
PROBE NO.	DEPTH(M)	DELT(C)	STAN. ERR.
9538	0.00	0.000	0.0001
1111	1.14	0.163	0.0068
1157	2.66	0.264	0.0050
1105	4.30	0.405	0.0046
1145	6.15	0.502	0.0057

THE BOTTOM WATER TEMPERATURE IS 2.02

GRADIENTS AND STANDARD ERRORS

	1	2	3	4	5
1	******	0.1433	0.0993	0.0941	0.0816
	*****	0.0060	0.0018	0.0010	0.0009
2	******	*******	0.0662	0.0763	0.0675
	*****	******	0.0056	0.0026	0.0017
3	******	*******	*******	0.0856	0.0681
	*****	******	******	0.0041	0.0021
4	******	*******	*******	*******	0.0526
	*****	******	******	******	0.00[illegible]

TGRAD STATION V32-018 11APR 75



EQUILIBRIUM TEMPERATURE DIFFERENTIAL ESTIMATES

PROBE NO.	DEPTH(M)	DELT(C)	STAN.ERR.
9538	0.00	0.000	0.0041
1157	0.25	-0.016	0.0076
1105	1.89	0.258	0.0051
1145	3.56	0.447	0.0064

THE BOTTOM WATER TEMPERATURE IS 2.04

GRADIENTS AND STANDARD ERRORS (C/m)

	1	2	3	4
1	******	-0.0651	0.1362	0.1255
	*****	0.0348	0.0035	0.0021
2	******	*******	0.1669	0.1399
	*****	******	0.0056	0.0030
3	******	*******	*******	0.1134
	*****	******	******	0.0049

TABLE 1

VEMA CRUISE 32 DATA AT SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow (HFU)	Evaluation	T'Grad
22°51.5'	50°32.8'	4749	610	3	0.74	2.09	1.55	6	11
23°08.4'	50°23.5'	5171				1.93			12A
23°07.3'	49°44.2'	5143				1.83			12B
23°27.5'	50°12.2'	4918	592	4	0.66	2.01	1.33	6	12
23°27.4'	50°14.0'	4914	552	4	0.654	2.03	1.32	10	13
23°28.4'	50°12.6'	4914				1.85			14
25°28.9'	57°10.7'	5300	616	4	0.434	1.80	0.78	8	15
25°59.0'	58°13.3'	6249	617	3	0.57NL	1.90	1.08	6	16
24°35.8'	57°47.0'	5610	615	4	0.675	1.85	1.25	7	17
24°21.5'	58°08.5'	6034	356	3	1.4	1.73	2.4	6	18

P = penetration into sediment, N = number of probes in the mud, NL = non-linear gradient.

PART C

DEEP-SEA PHOTOGRAPHS

One representative photograph is shown for each camera station obtained. We show all 12 frames for station K-70 in which large variability in sea-floor microtopography is observed. The field of view for camera stations K61 - K63 is $\sim$4.5 x 4 meters and for stations K64 - K71 is $\sim$ 1.8 x 1.6 meters.

28 March 1975

K #61, 4749 m

Lat: 22°51.5N

Long: 50°32.8W

Frame 2 of 15

29 March 1975

K #62, 5171 m

Lat: 23°08.4N

Long: 50°23.5W

Frame 2 of 18

31 March 1975

K #63, 5143 m

Lat: 23°07.3N

Long: 49°44.2W

Frame 4 of 19

08 April 1975

K #64, 5300 m

Lat: 25°28.9N

Long: 57°10.7W

Frame 5 of 15

08 April 1975

K #65, 6249 m

Lat: 25°59.0N

Long: 58°13.3W

Frame 12 of 14

09 April 1975

K #66, 5885 m

Lat: 25°10.6N

Long: 58°27.8W

Frame 9 of 14

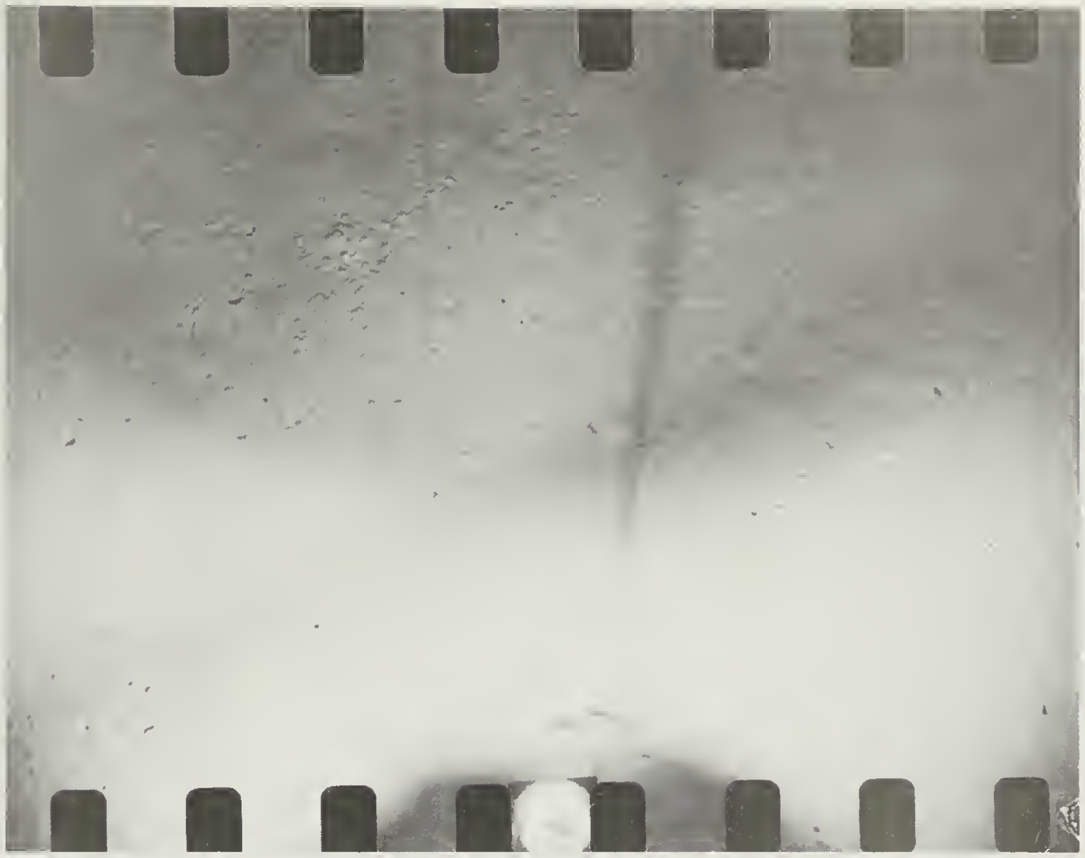
10 April 1975

K #67, 5610 m

Lat: 24°35.8N

Long: 57°47.0W

Frame 10 of 14



11 April 1975

K #68, 6034 m

Lat: 24°21.5N

Long: 58°08.5W

Frame 7 of 9

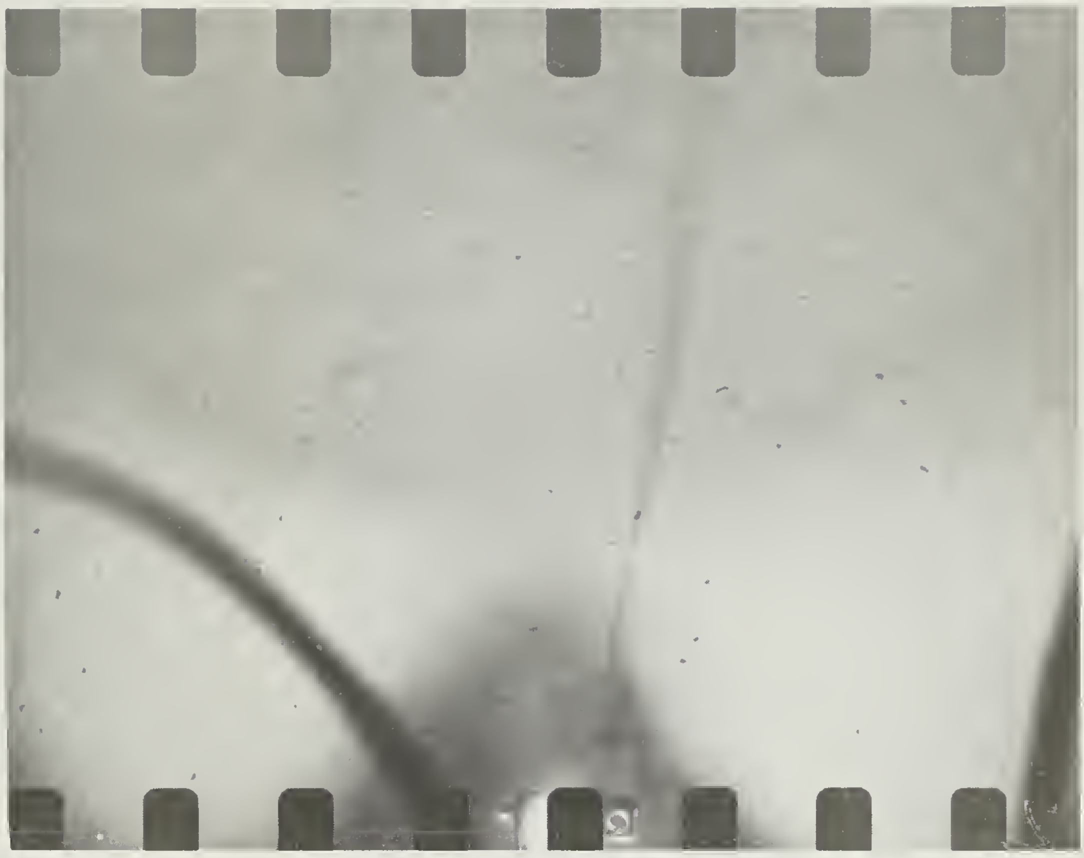
14 April 1975

K #69, 5850 m

Lat: 25°36.0N

Long: 57°36.8W

Frame 2 of 8



18 April 1975

K #71, 5820 m

Lat: 25°44.6N

Long: 59°15.9W

Frame 1 of 6

K #70 1

K #70 2

K #70 3

K #70 4

16 April 1975 Depth: 5570 m
Lat: 25°56.5N Long: 59°57.3W

K #70 9

K #70 10

K #70 11

K #70 12

K #70 5

K #70

K #70 7

K #70 8

PART D

NEPHELOMETER RESULTS

The units of measure are a ratio of the film exposures produced by the scattered light E to that produced by the direct, attenuated light E_D. The use of the ratio E/E_D compensates for any changes in intensity of the light source, transport speed of the film, developing of the film, or film sensitivity and is a function of scattering only. For a complete description of the data reduction methods the reader is referred to Sullivan et al. (1973).

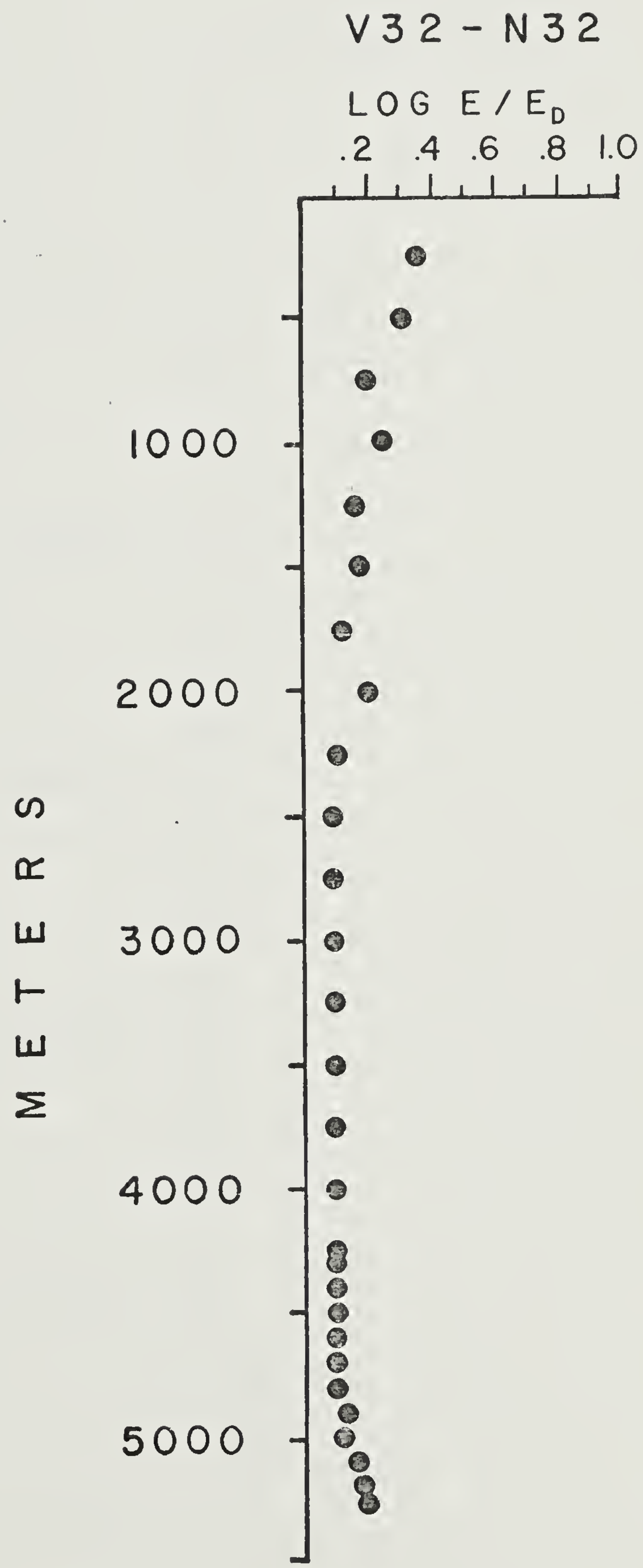
08 April 1975

N-32, 5300 m

Lat: 25°28.9N

Long: 57°10.7W

DEPTH	FINAL SCATT
250.	0.37
500.	0.33
750.	0.21
1000.	0.26
1250.	0.18
1500.	0.19
1750.	0.13
2000.	0.21
2250.	0.11
2500.	0.09
2750.	0.10
3000.	0.10
3250.	0.10
3500.	0.10
3750.	0.10
4000.	0.10
4250.	0.10
4300.	0.10
4400.	0.10
4500.	0.10
4600.	0.10
4700.	0.10
4800.	0.10
4900.	0.13
5000.	0.11
5100.	0.15
5200.	0.16
5280.	0.18



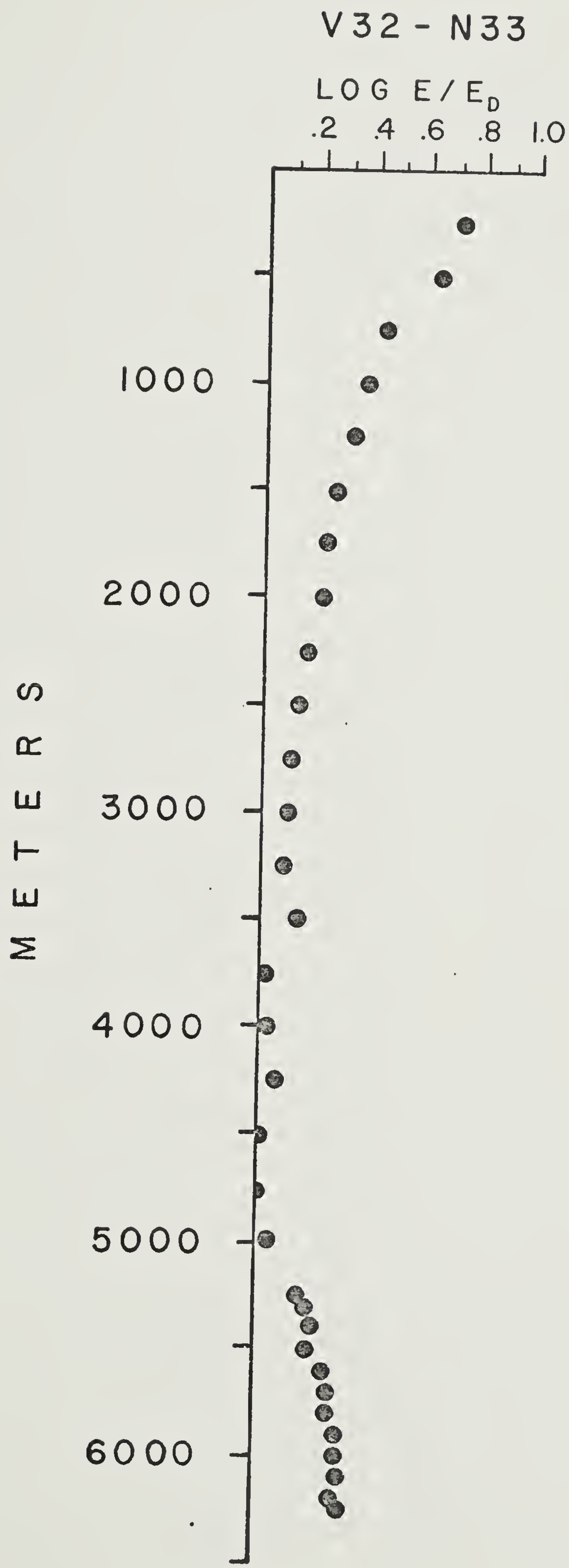
08 April 1975

N-33, 6249 m

Lat: 25°59.0N

Long: 58°13.3W

DEPTH	FINAL SCATT
250.	0.71
500.	0.63
750.	0.43
1000.	0.37
1250.	0.32
1500.	0.25
1750.	0.22
2000.	0.21
2250.	0.16
2500.	0.13
2750.	0.11
3000.	0.10
3250.	0.08
3500.	0.14
3750.	0.02
4000.	0.03
4250.	0.06
4500.	0.01
4750.	0.00
5000.	0.04
5250.	0.16
5300.	0.19
5400.	0.21
5500.	0.20
5600.	0.26
5700.	0.27
5800.	0.27
5900.	0.30
6000.	0.31
6100.	0.32
6200.	0.30



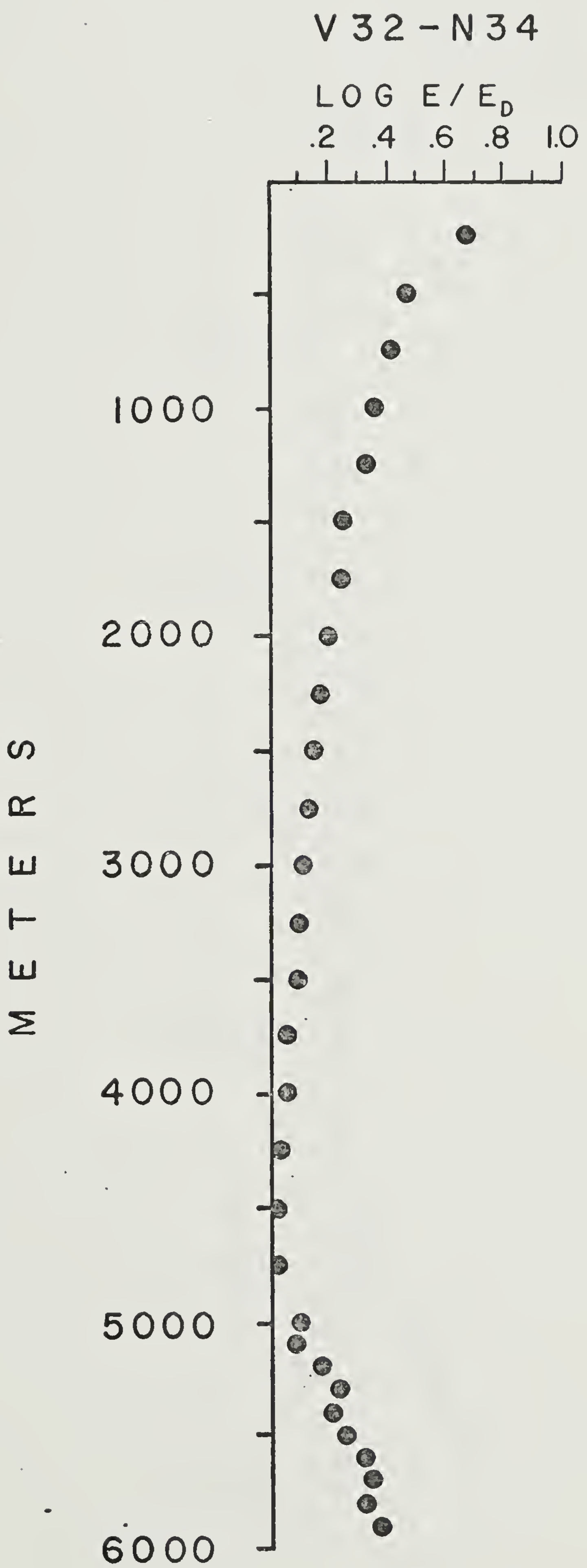
09 April 1975

N-34, 5885 m

Lat: 25°10.6N

Long: 58°27.8W

DEPTH	FINAL SCATT
250.	0.68
500.	0.48
750.	0.43
1000.	0.36
1250.	0.33
1500.	0.25
1750.	0.24
2000.	0.20
2250.	0.17
2500.	0.14
2750.	0.13
3000.	0.11
3250.	0.09
3500.	0.08
3750.	0.05
4000.	0.05
4250.	0.02
4500.	0.01
4750.	0.02
5000.	0.09
5100.	0.07
5200.	0.16
5300.	0.22
5400.	0.20
5500.	0.25
5600.	0.31
5700.	0.33
5800.	0.32
5900.	0.37



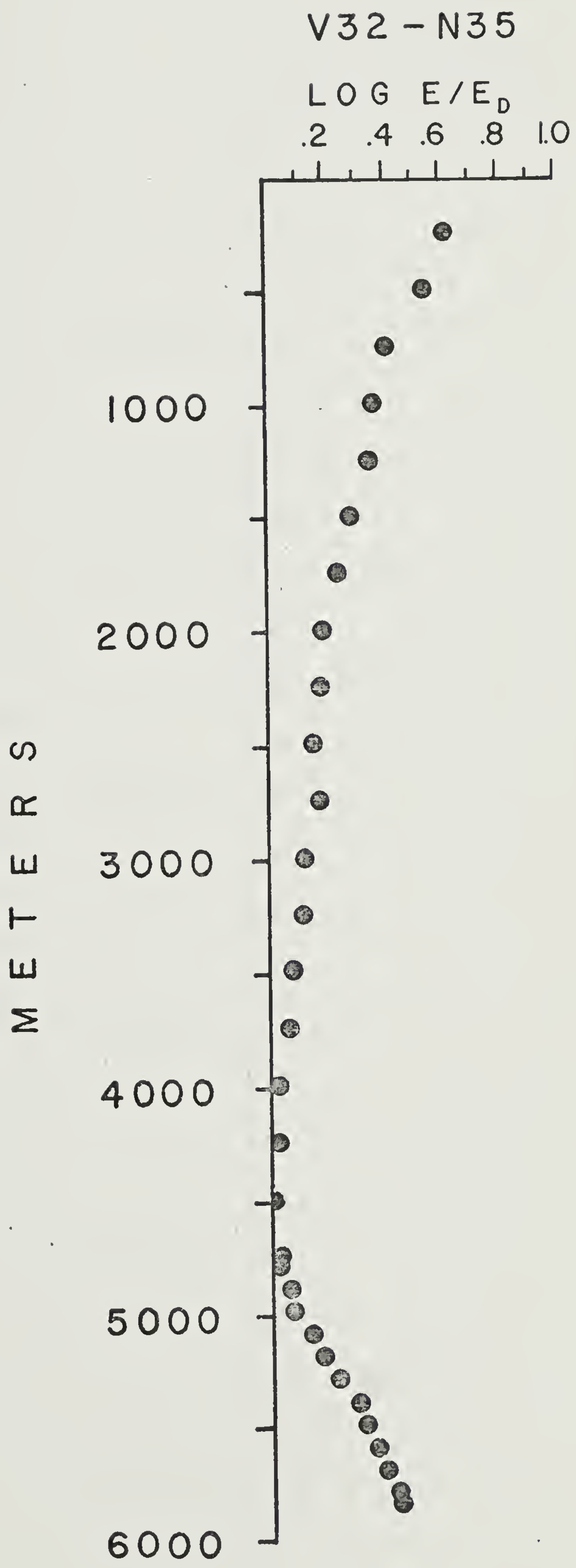
11 April 1975

N-35, 6034 m

Lat: 24°21.5N

Long: 58°08.5W

DEPTH	FINAL SCATT
250.	0.61
500.	0.54
750.	0.41
1000.	0.36
1250.	0.35
1500.	0.28
1750.	0.23
2000.	0.18
2250.	0.17
2500.	0.14
2750.	0.17
3000.	0.11
3250.	0.10
3500.	0.07
3750.	0.05
4000.	0.01
4250.	0.01
4500.	0.00
4750.	0.02
4800.	0.01
4900.	0.05
5000.	0.06
5100.	0.12
5200.	0.16
5300.	0.22
5400.	0.28
5500.	0.32
5600.	0.35
5700.	0.38
5800.	0.42
5850.	0.43



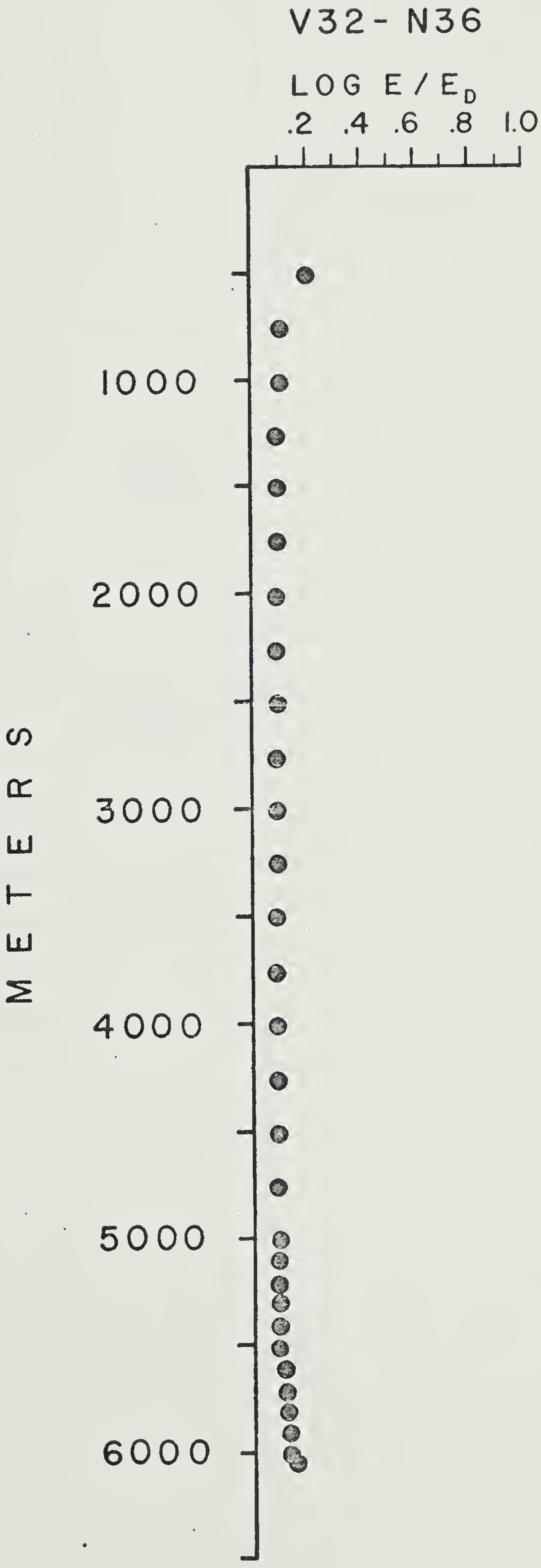
14 April 1975

N-36, 5850 m

Lat: 25°36.0N

Long: 57°36.8W

DEPTH	FINAL SCATT
250.	0.44
500.	0.20
750.	0.11
1000.	0.11
1250.	0.10
1500.	0.10
1750.	0.10
2000.	0.10
2250.	0.10
2500.	0.10
2750.	0.10
3000.	0.10
3250.	0.10
3500.	0.10
3750.	0.10
4000.	0.10
4250.	0.10
4500.	0.10
4750.	0.10
5000.	0.10
5100.	0.10
5200.	0.10
5300.	0.10
5400.	0.09
5500.	0.09
5600.	0.12
5700.	0.13
5800.	0.13
5900.	0.14
6000.	0.14
6040.	0.17



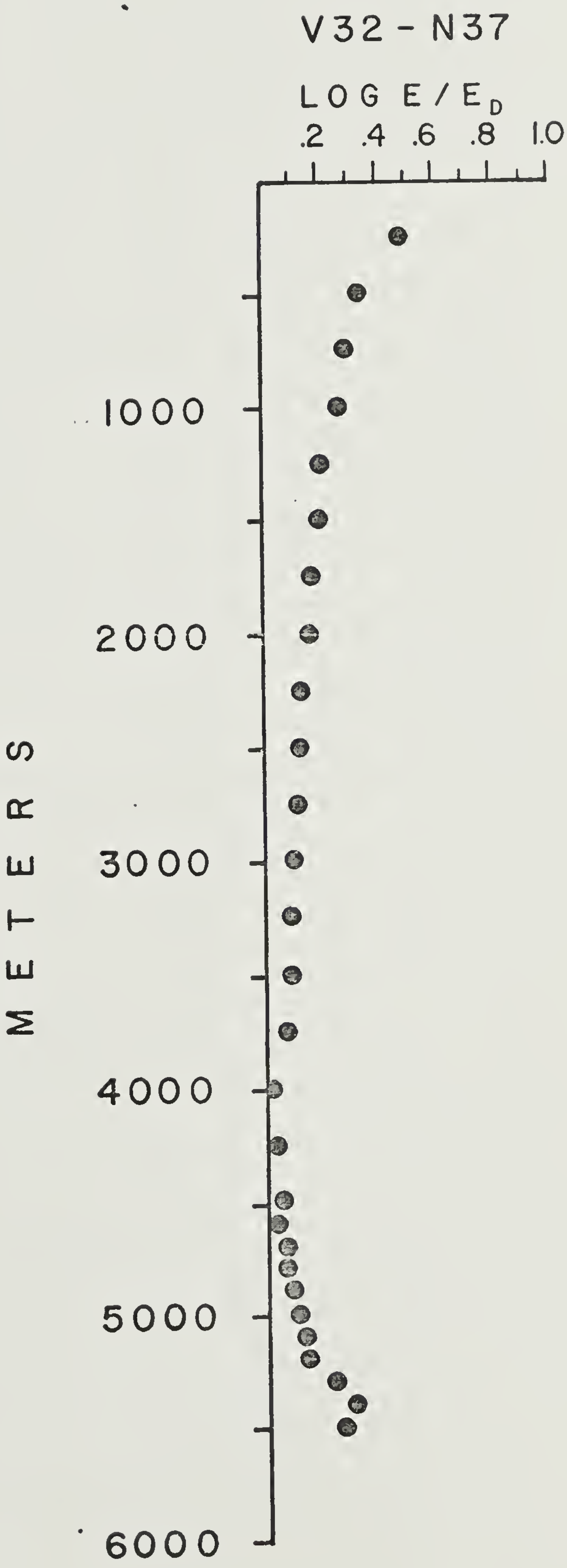
16 April 1975

N-37, 5570 m

Lat: 25°56.5N

Long: 59°57.3W

DEPTH	FINAL SCATT
250.	0.48
500.	0.33
750.	0.28
1000.	0.26
1250.	0.19
1500.	0.19
1750.	0.16
2000.	0.15
2250.	0.11
2500.	0.11
2750.	0.10
3000.	0.09
3250.	0.08
3500.	0.08
3750.	0.06
4000.	0.00
4250.	0.02
4500.	0.04
4600.	0.02
4700.	0.05
4800.	0.05
4900.	0.07
5000.	0.09
5100.	0.11
5200.	0.12
5300.	0.22
5400.	0.29
5500.	0.25



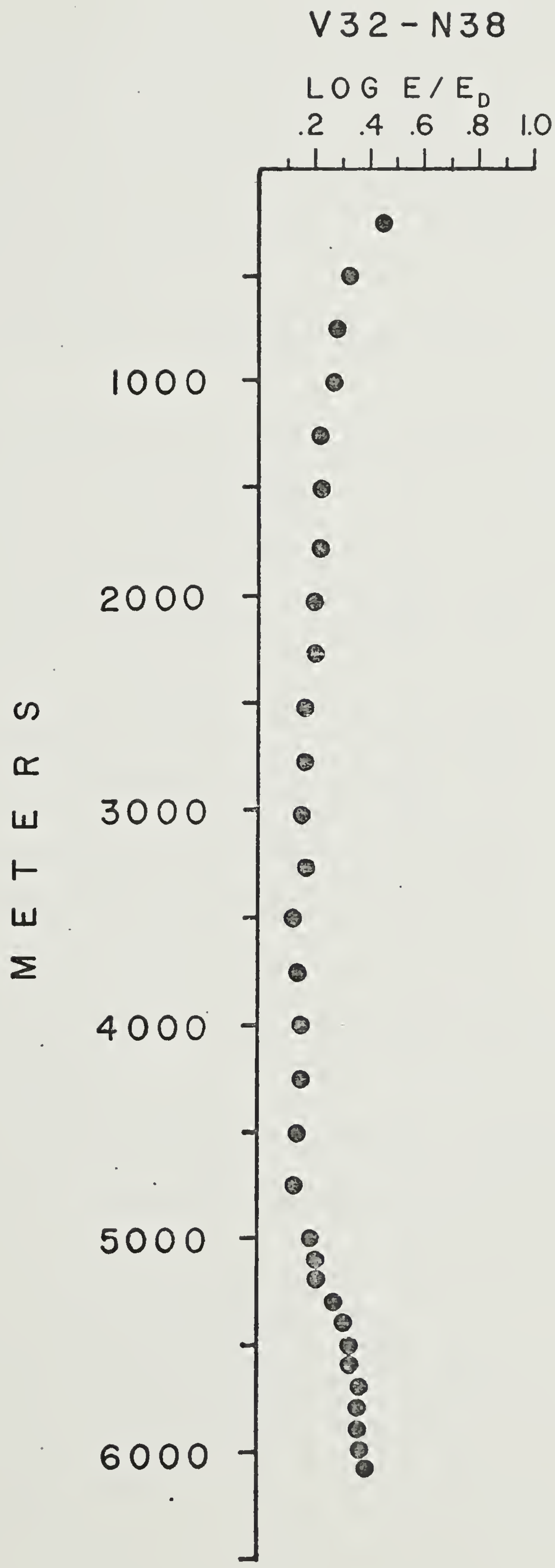
18 April 1975

N-38, 5820 m

Lat: 25°44.6N

Long: 59°15.9W

DEPTH	FINAL SCATT
250.	0.47
500.	0.34
750.	0.29
1000.	0.28
1250.	0.23
1500.	0.23
1750.	0.23
2000.	0.21
2250.	0.21
2500.	0.17
2750.	0.17
3000.	0.17
3250.	0.18
3500.	0.12
3750.	0.15
4000.	0.15
4250.	0.16
4500.	0.14
4750.	0.12
5000.	0.18
5100.	0.21
5200.	0.21
5300.	0.28
5400.	0.31
5500.	0.33
5600.	0.33
5700.	0.37
5800.	0.36
5900.	0.36
6000.	0.37
6080.	0.39



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LAMONT-DOHERTY GEOLOGICAL OBSERVATORY

OF COLUMBIA UNIVERSITY

PALISADES, NEW YORK

Results of IPOD Site Surveys Aboard R/V VEMA Cruise 3207

PART B: CANDIDATE SITE 4

Philip D. Rabinowitz and William J. Ludwig

Technical Report No. CU-3-75

International Phase of Ocean Drilling Grant 25905

of National Science Foundation Subcontract UC-NSF-C842-2

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Illustrations

Introduction

As one of several organizations in the United States participating in the International Phase of Ocean Drilling (Geotimes, June, 1975), the Lamont-Doherty Geological Observatory recently conducted the first in a series of problem-oriented surveys of the candidate site areas (Figure 1) for the purpose of providing the information necessary to locate optimum sites for deep drilling and to integrate the corehole results with the regional geological and geophysical setting. The site surveys were made aboard R. V. VEMA during February and March of 1975. Continuously recorded bathymetric, seismic reflection, gravity, and magnetics measurements were obtained along the ship's track. On station coring, heat flow, camera and nephelometer stations were made in select locations. The data collected on these sites are given in part A of these data reports.

In this report the scientific results of candidate site 4 are presented* which indeed illustrate the necessity for making detailed area surveys prior to the selection of the actual drill site. Site 4 is situated in the region of magnetic anomaly 13 (∿ 38 m.y.B.P.) west of the Mid-Atlantic ridge axis in the central North Atlantic Ocean (Fig. 1). The survey was confined to an approximate 1° square centered near 23° 00'N and 50° 15'W. Two longer lines were obtained in order to aid in the recognition of the magnetic lineation pattern in this region.

*The gravity, magnetics and bathymetric data are presented as either contours or profiles along the ship's track on a mercator projection. These maps have been made available to the IPOD site survey management at L-DGO at an enlarged scale (20"/degree longitude).

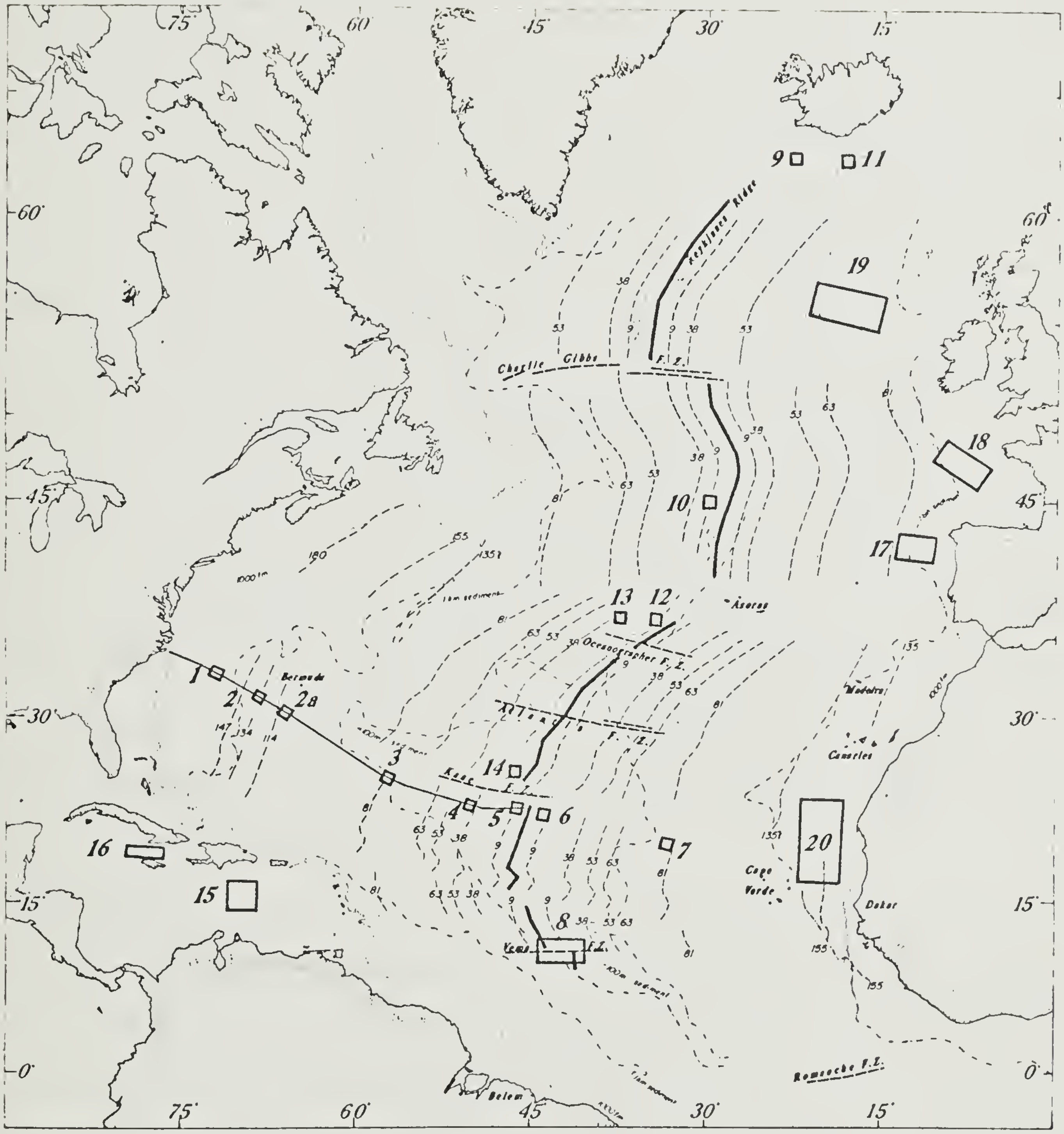

Figure 1. Proposed Atlantic drilling sites for International Phase of Ocean Drilling. Sites 3, 4, 7 and 8 were surveyed by R/V VEMA in February and March, 1975.

Based on the data collected recommendations are given for the location of the drill hole at candidate site 4.

Interpretation of Site 4 Data

The bathymetric results shown in Figures 2 and 3 are very complex. The most prominent feature, located near the center of the grid, is a nearly continuous deep trough (>5.0 km) with an azimuth of approximately 100° and which is bordered to the south by a nearly parallel ridge. This trough has the same azimuth as the Kane fracture zone trough located approximately 175 km to the north and, as described below, is itself the axis of a fracture zone. Linear topographic highs and lows are observed normal to the axis of the fracture zone trough only in the northeast segment of the survey area. Other linear topographic segments, may be present but their orientation is not normal to the fracture zone trough. The trends in the free-air gravity anomalies shown in figure 4 are similar to the topography. A free-air gravity minimum, generally more negative than -25 mgals, is associated with the topographic trough. In a similar fashion to the topographic map, linear free-air gravity anomalies trending normal to the axis of the fracture zone are present only on the north-east segment of the grid area.

The magnetic anomalies are presented in figure 5 in the form of profiles along the ship's track. Anomaly 13 (38 m.y.B.P.; Heirtzler et al., 1968) is observed throughout the grid survey. In general, it would be very difficult to precisely identify a single magnetic anomaly or isochron by merely observing a few wavelengths of anomalies on either side of the anomaly of interest. In this case we have in our data library continuous profiles of magnetic data from approximately 150 km east of anomaly 13 to several hundreds of kilometers to the west. We have been able to identify not only anomaly 13 but many other diagnostic sequences of anomalies to the west. Therefore, we feel justified in our identification of anomaly 13 in the survey region. The axis

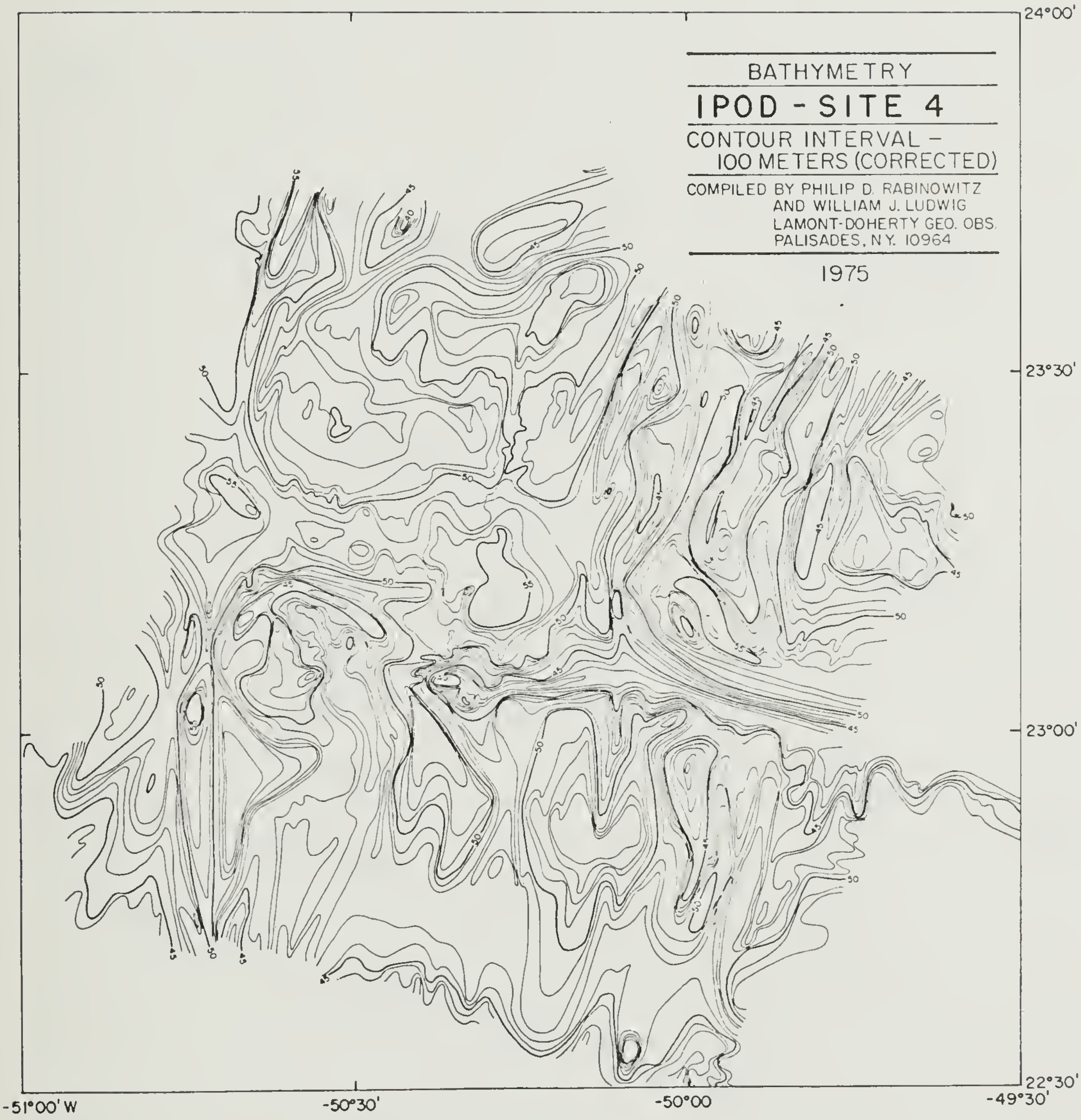

Figure 2. Bathymetry for IPOD site 4 survey area. Contours are corrected meters; contour interval in hundreds of meters.

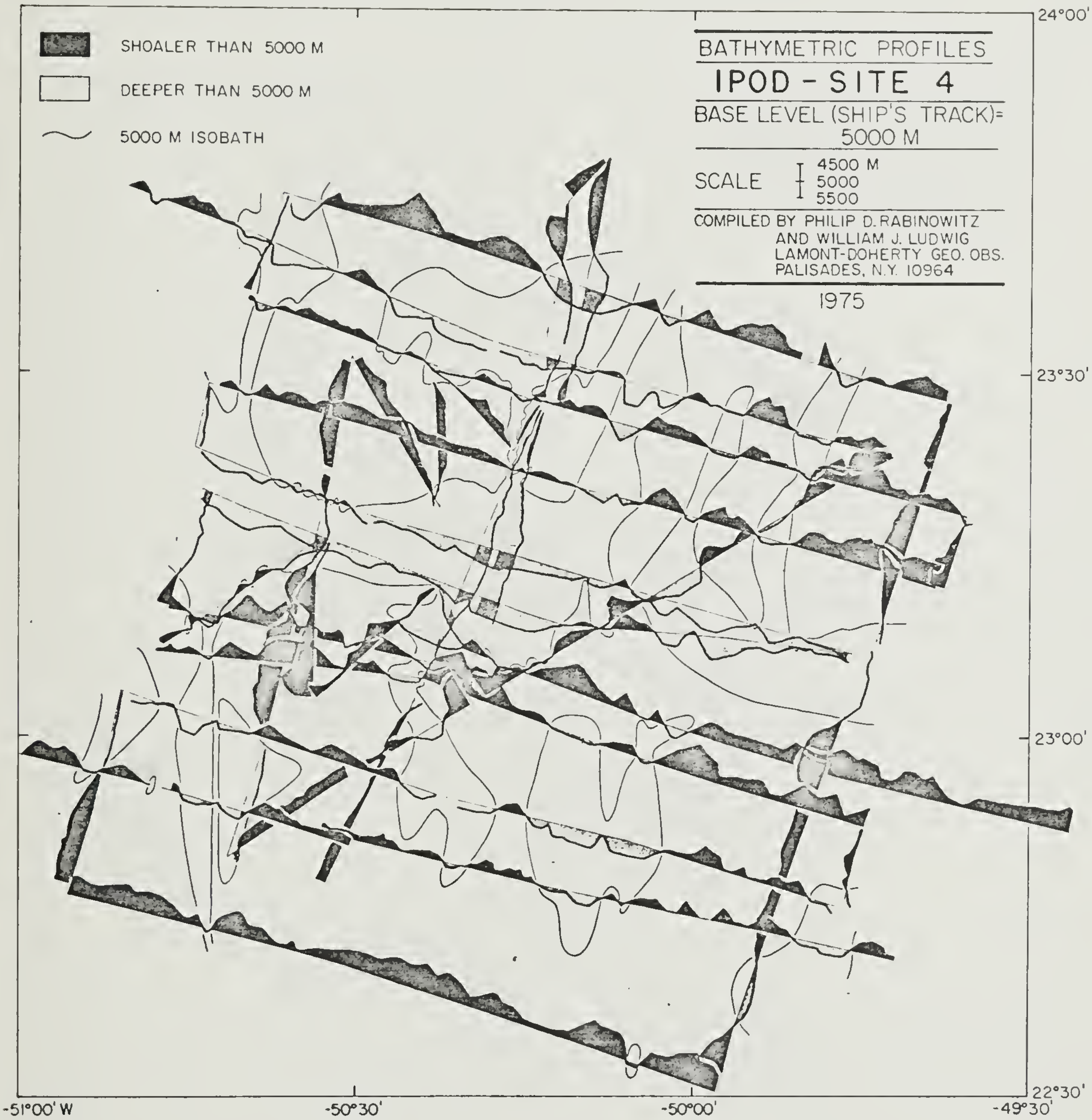

Figure 3. Bathymetric profiles for IPOD site 4. Ships track is base level of 5000 m.

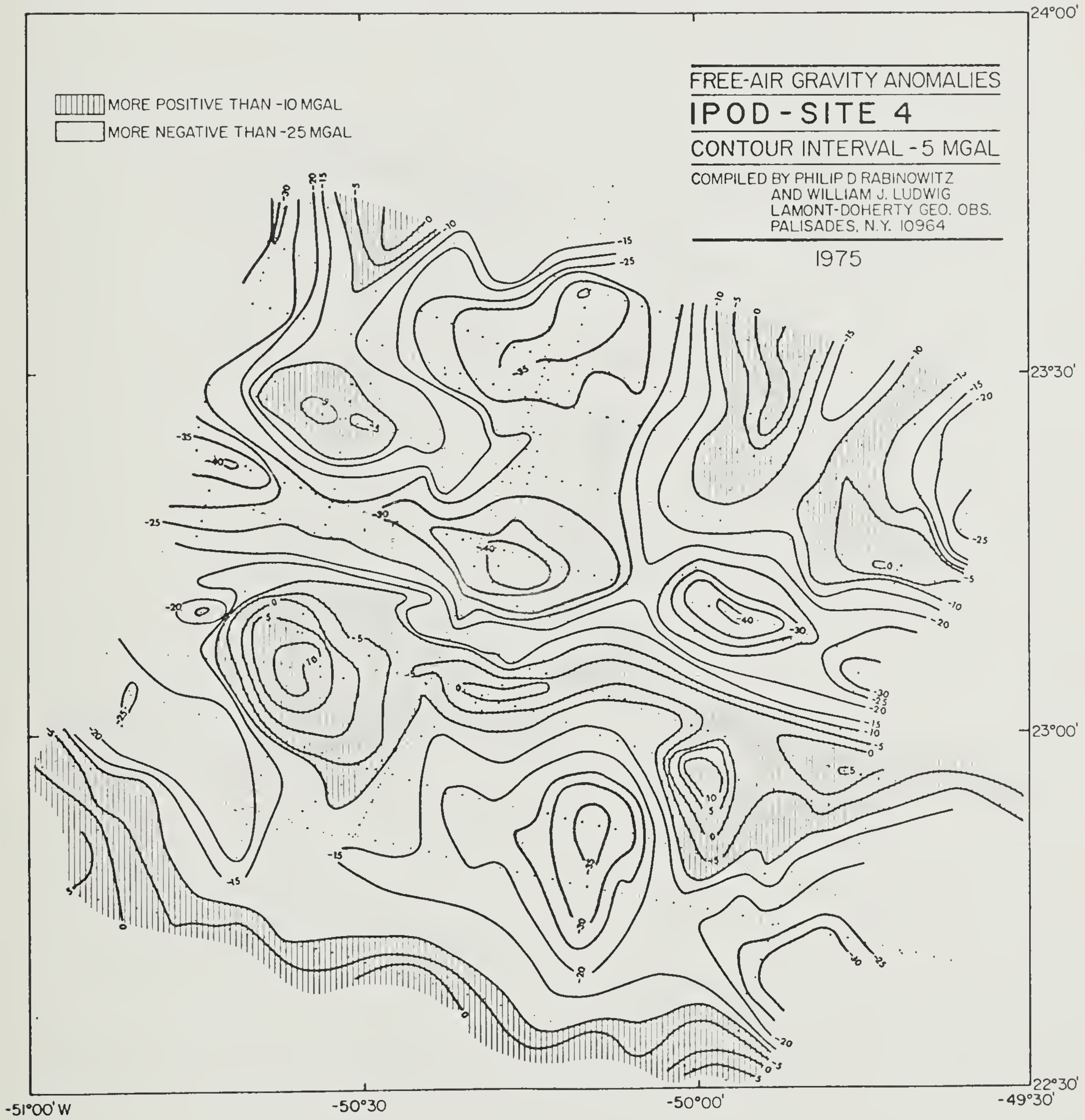

Figure 4. Free-air gravity anomaly map for IPOD Site 4 survey area. Contours interval 5 mgal; estimated error less than 2 mgal.

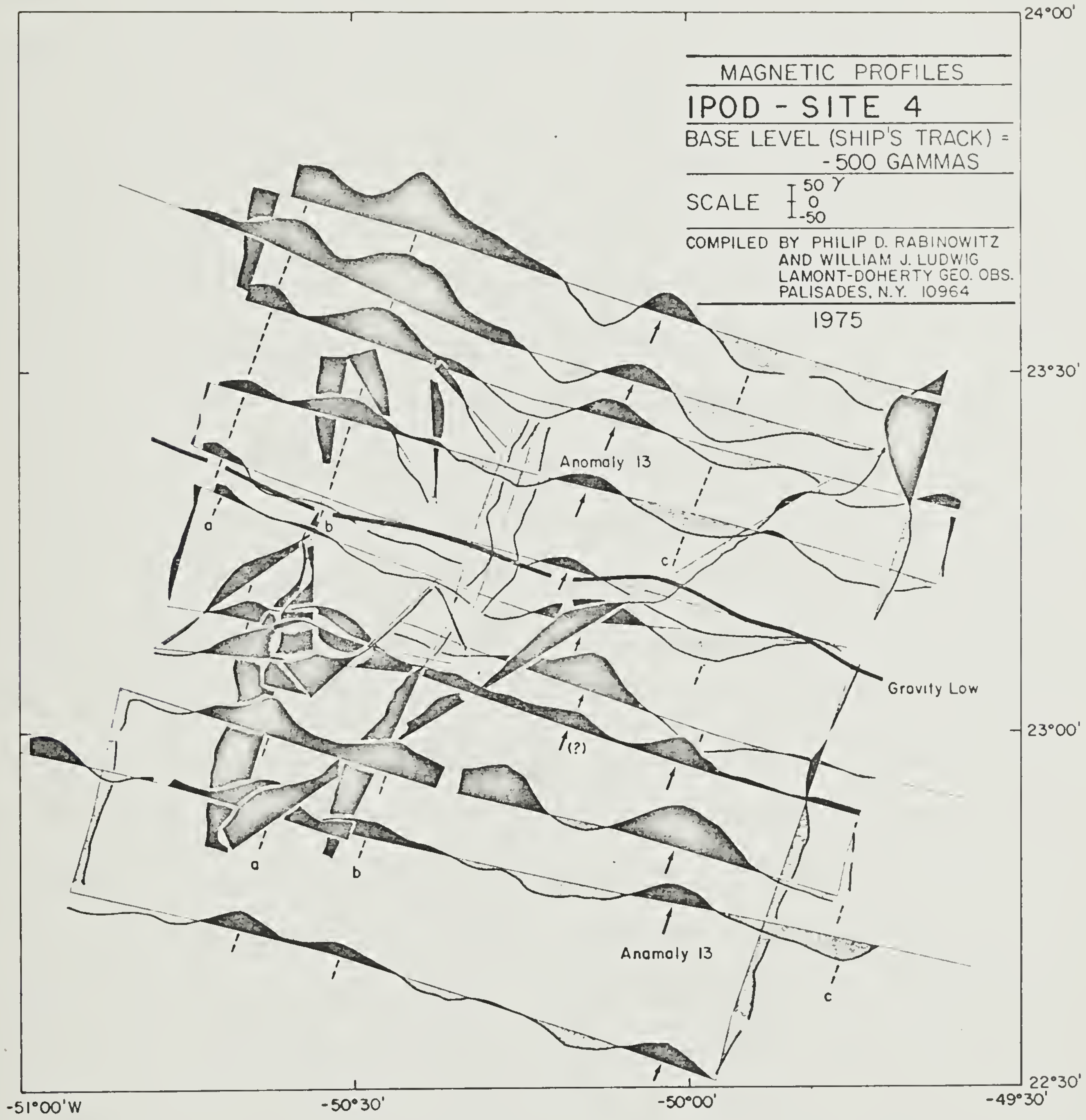

Figure 5. Magnetic anomalies plotted normal to ship's track for IPOD Site 4 survey area. Anomaly 13 indicated by heavy arrows. Smaller arrows show location of other correlatable magnetic anomalies. Axis of free-air gravity low associated with fracture zone trough given by heavy line.

of the fracture zone trough is designated by the gravity low in the magnetic anomaly map. North of this fracture zone trough, the peaks and troughs in the magnetic anomalies are very well lineated and are normal to the trough. No offsets in the anomaly pattern are observed north of the fracture zone trough. However, south of the trough, we observe several left lateral offsets of anomaly 13. The total displacement of anomaly 13 from the region just to the north of the fracture zone trough to the southern limit of our survey area is about 40 km. We should note that the largest offset (approximately 15 km) is not located across the fracture zone trough but about 20 km to the south. In our four southernmost tracks, anomaly 13 is either offset by very small fracture zones (approximately 5 km) or is lineated obliquely to the major fracture zone trough and not paralleling the isochrons to the north. More detailed data is necessary to resolve whether fracture zone spacings less than 5 km are present in this region. Of particular interest is that the magnetic anomalies just to the north and very close to the axis of the fracture zone trough maintain their characteristic shape and are not influenced by the fracture zone. The amplitudes of these anomalies are somewhat attenuated as a result of the increase in depth to sea floor.

The ship's navigation and profiler records are shown in figures 6 and 7-1 to 7-14, respectively. The profiler records, which are keyed to the navigation illustrate the rugged nature of the sea floor topography. With the exception of discrete pockets of sediment the survey region is generally devoid of significant sediment accumulation (other than a thin veneer of sediments - generally less than 20-40 meters as revealed by the 3.5 kHz PDR records). These sediment pockets are generally observed in troughs either in deep depressions (> 5 km) or in local troughs within a regional high. In many instances, disturbances such as normal faulting are observed within the sediments. A sediment ponded

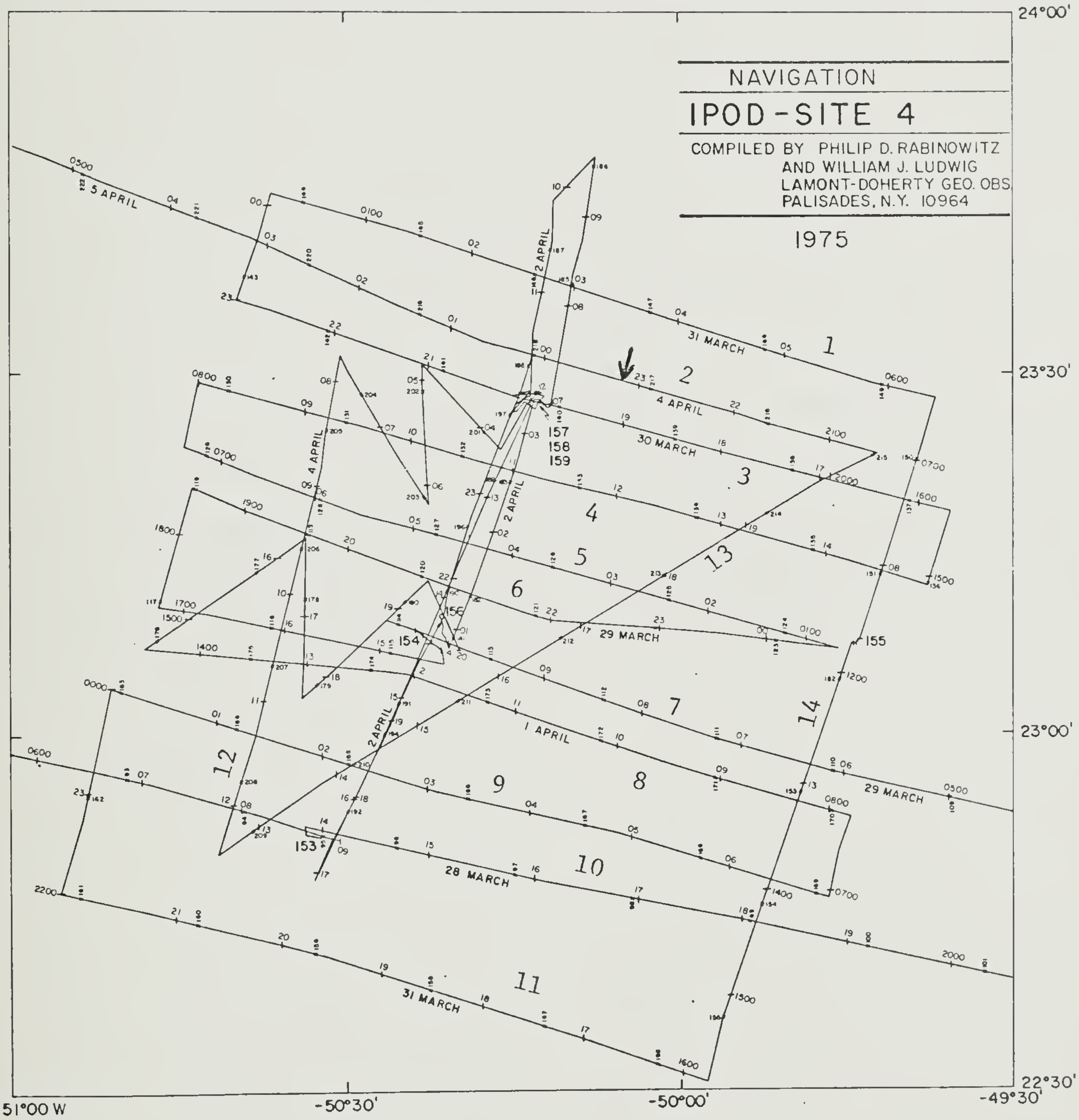

Figure 6. Navigation for IPOD site 4. Hour marks (local ship's time) annotated as well as every 10 miles along ships track. Nos. 153 to 159 denote ship stations. Nos. 1 thru 14 are locations of profiler records shown in figure 7.

Arrow denotes optimum drilling location.

depression (approximately 300 m) is present within the fracture zone trough. However, this sediment pond does not lie along the axis of the trough but obliquely traverses the trough near 23°05'N, 50°15'W (e.g. profile 7-6 @ 2100 hrs. and profile 7-7 @ 1030 hrs.).

In summary, the results of an IPOD site survey has revealed a fracture zone trough near the center of the grid surveyed. The trough which is very well defined gravimetrically and which parallels the major Kane fracture zone farther north separates the area surveyed into two rather different morphologic and tectonic settings. The area south of the trough is highly complex and is characterized by either numerous small left-lateral offsets or by spreading centers oblique to the fracture zone. North of the fracture zone trough we observe a more "normal" oceanic crust. No significant offsets in the magnetic lineation pattern are observed. In addition, we do observe, especially in the NE segment of the grid, lineated topographic highs and lows which trend normal to the fracture zone trough.

Figure 7. Seismic profiler records for IPOD site 4. Vertical scale in seconds of two-way reflection time (each horizontal line is equal to one second). Heavy line is at 7 seconds. Local ships time is given for keying to navigation (figure 6).

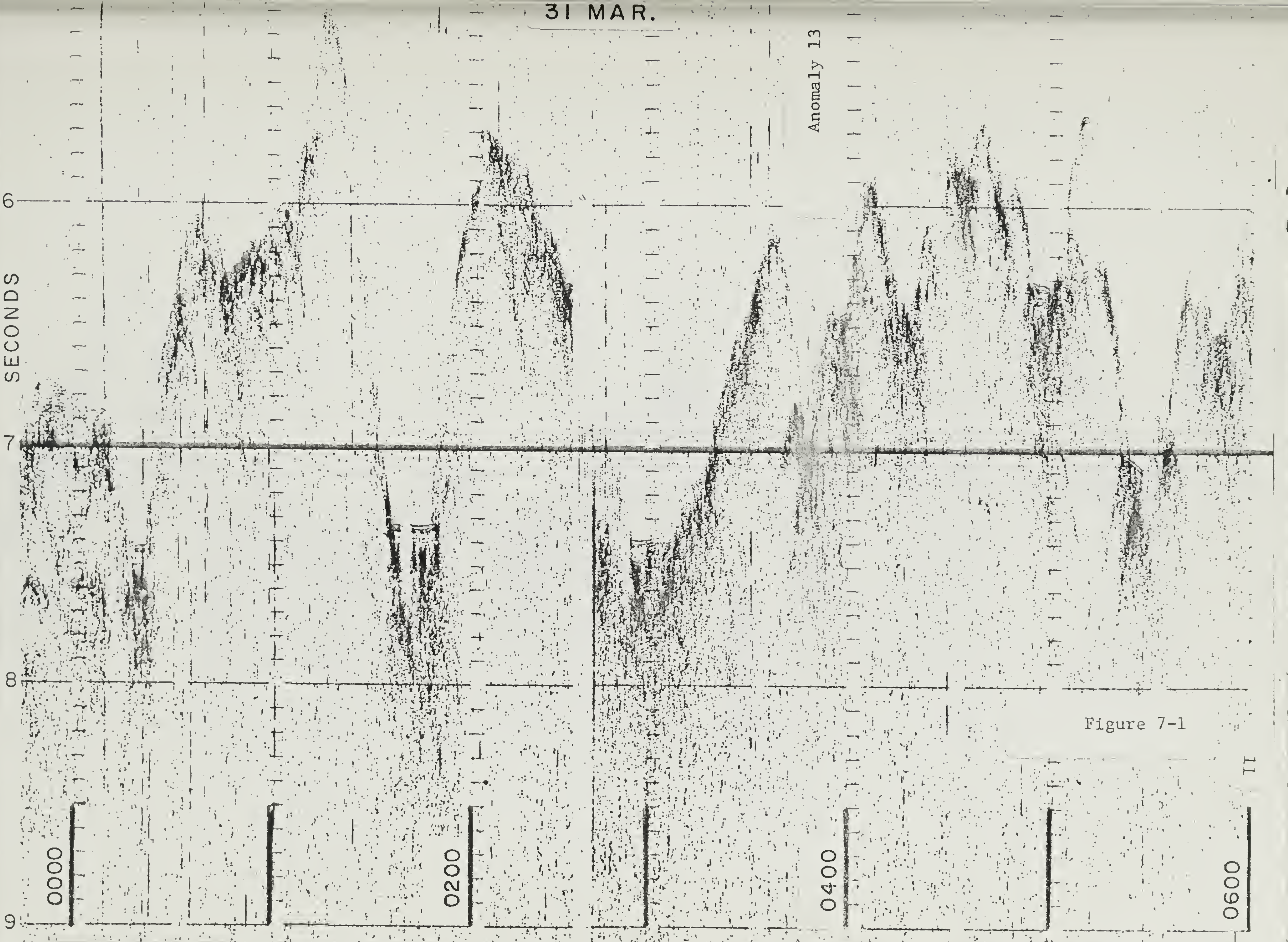

Figure 7-1

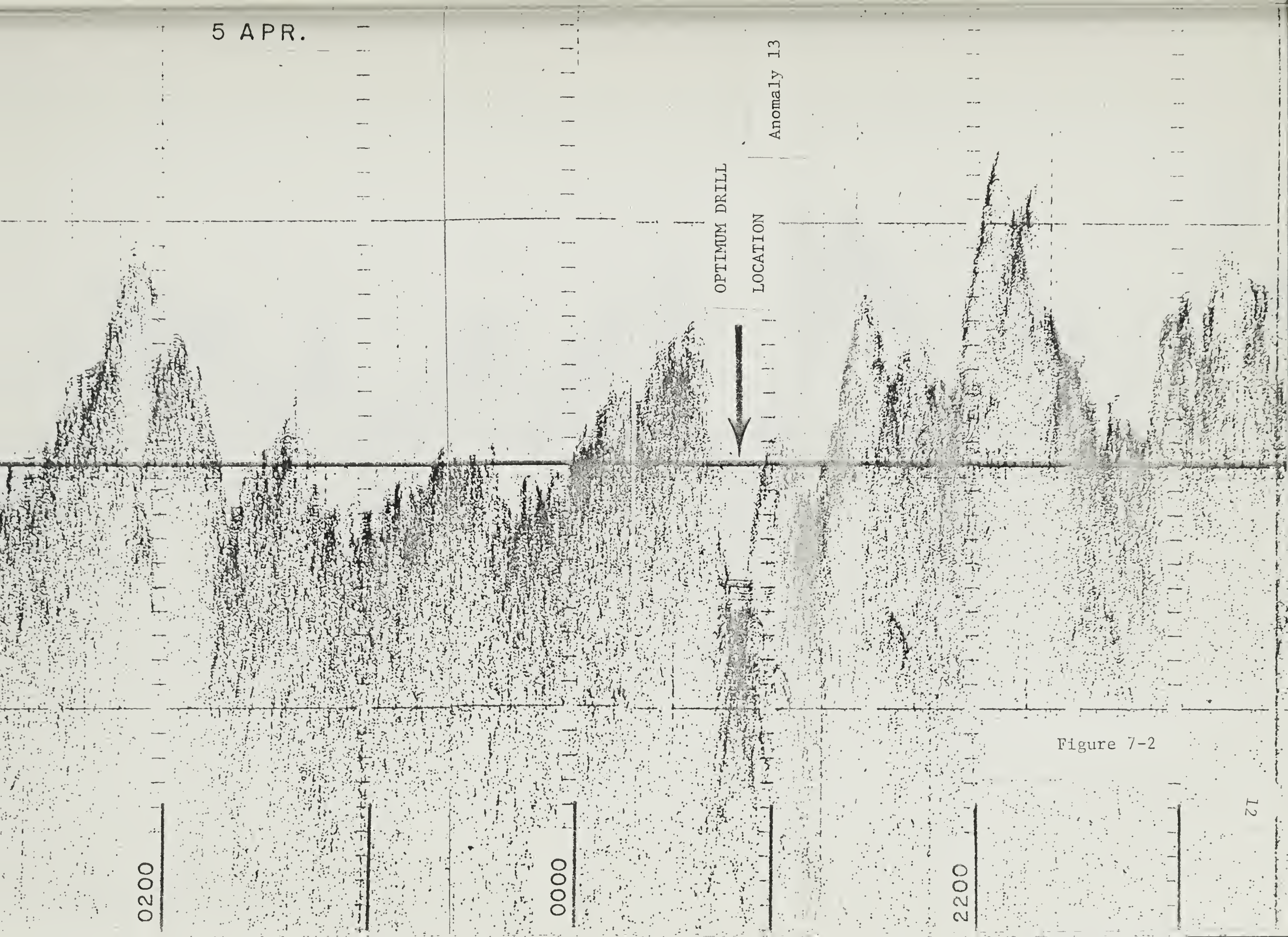

Figure 7-2

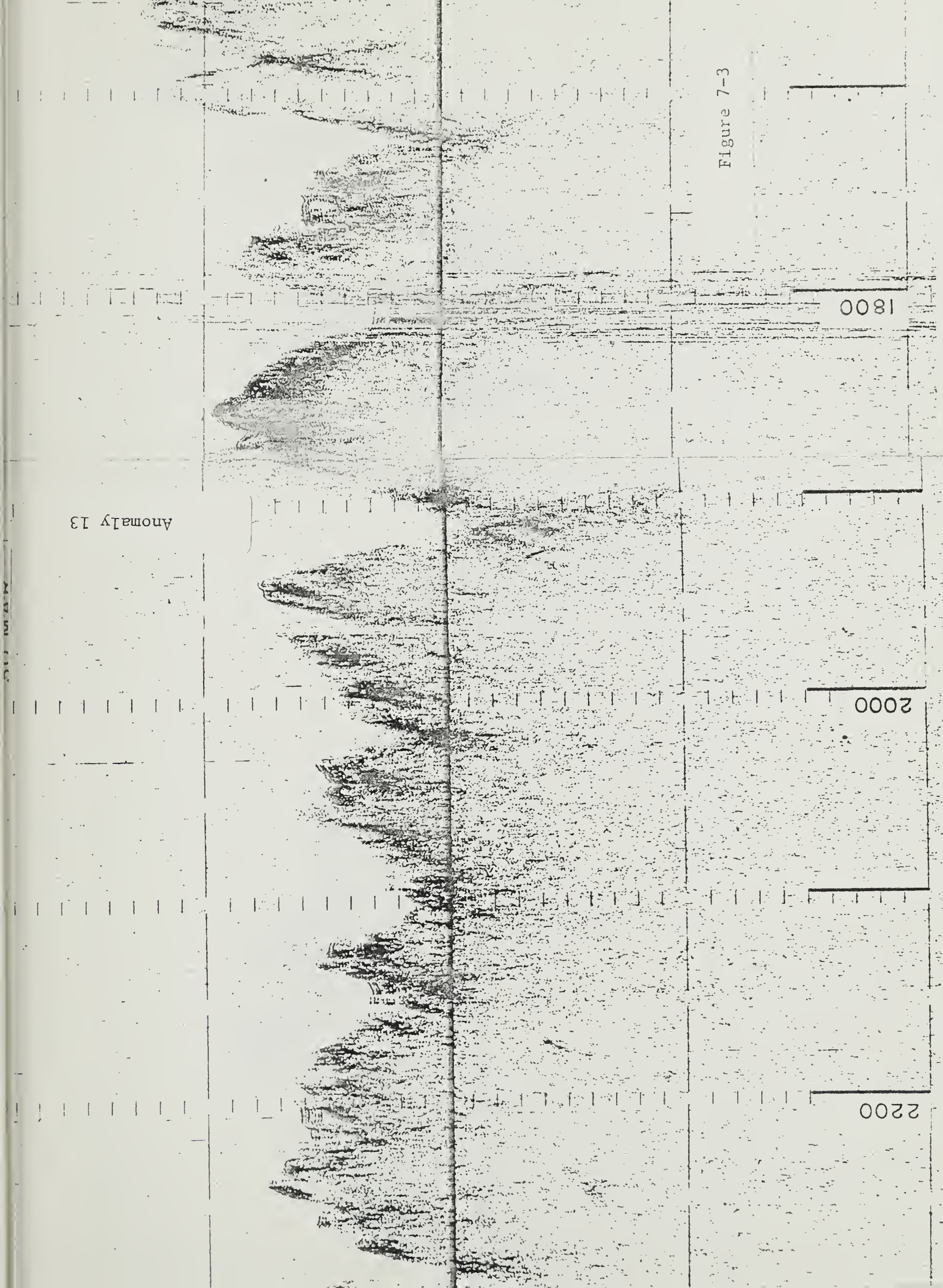

Figure 7-3

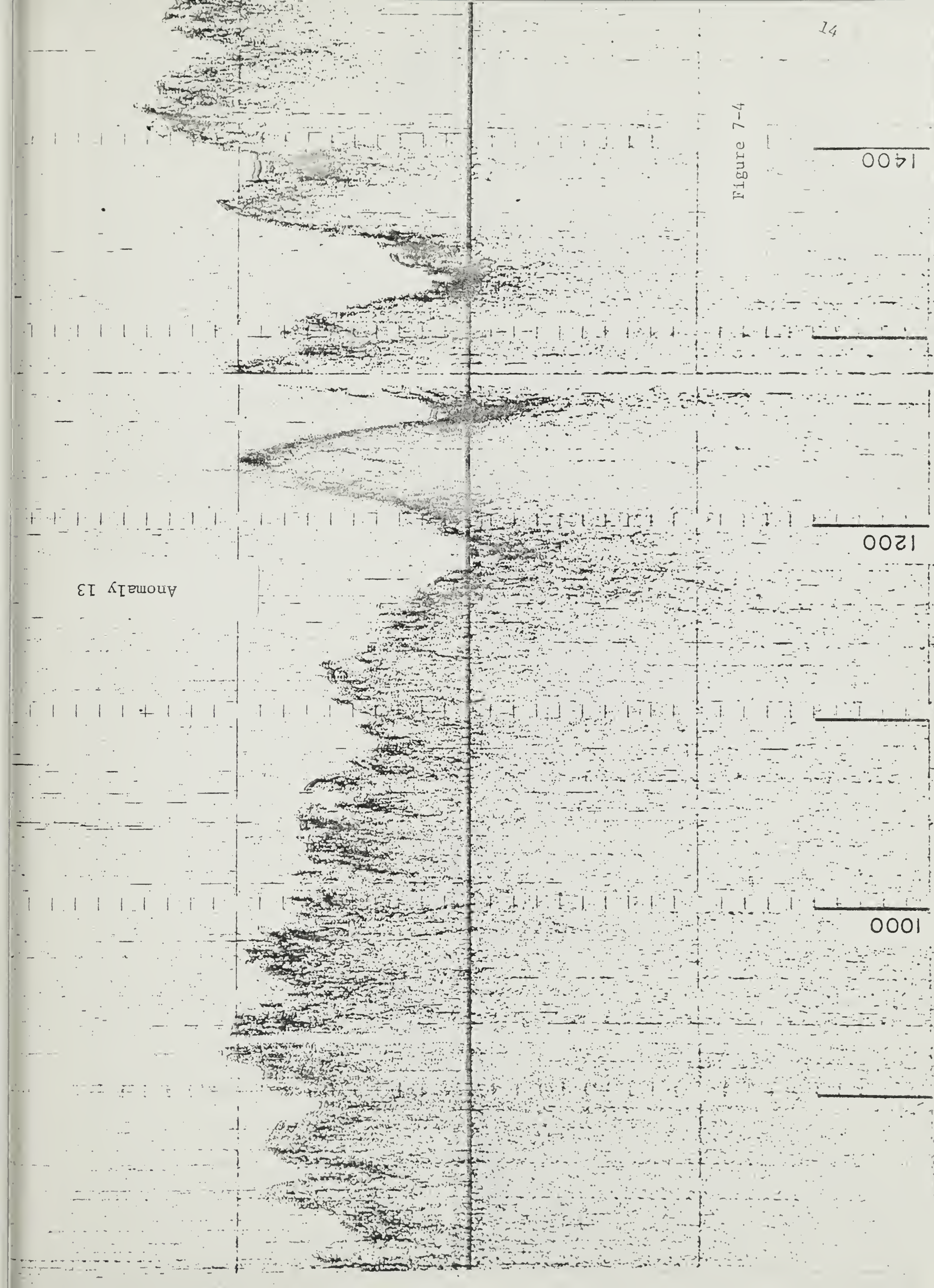

Figure 7-4

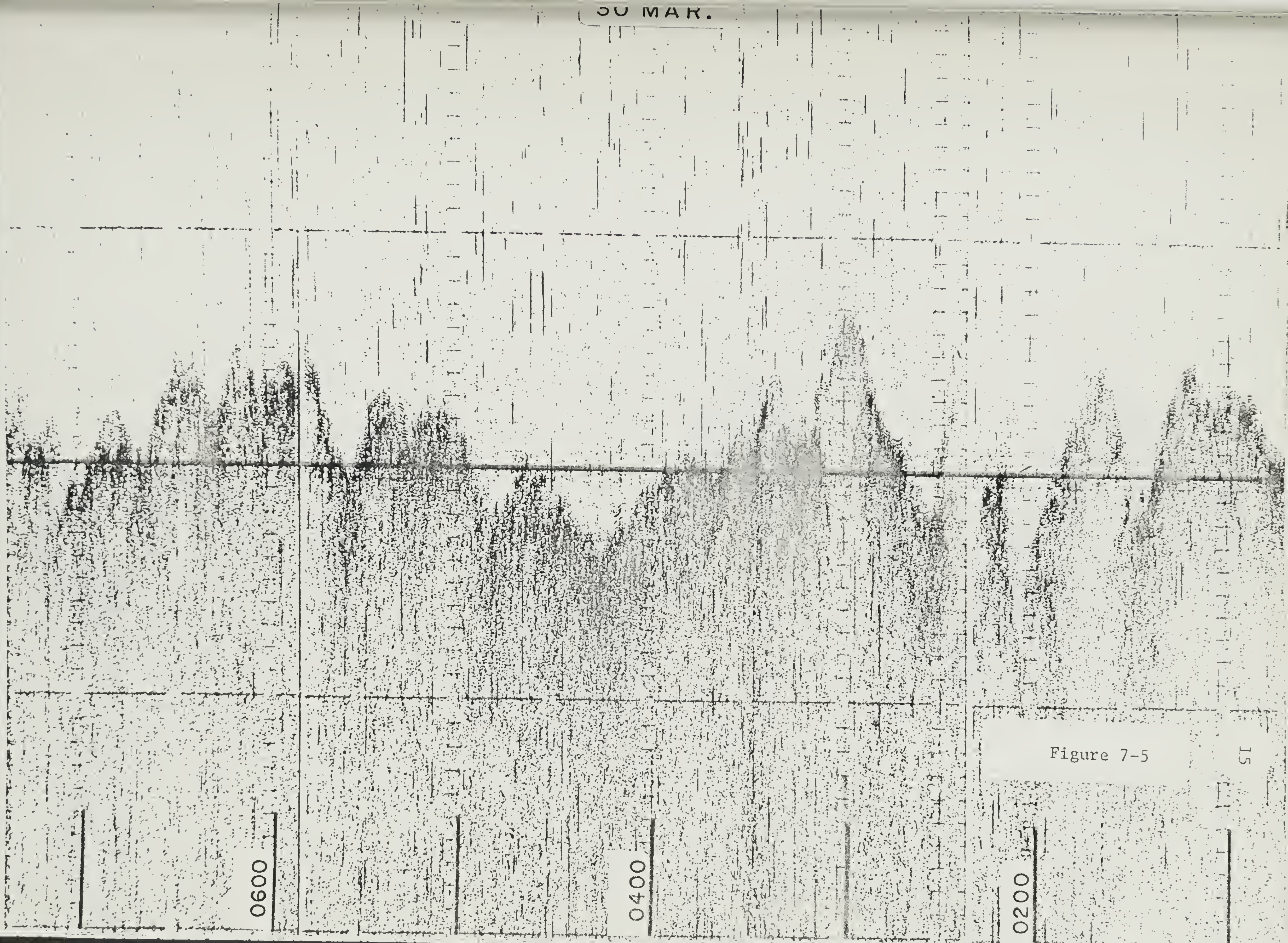

Figure 7-5

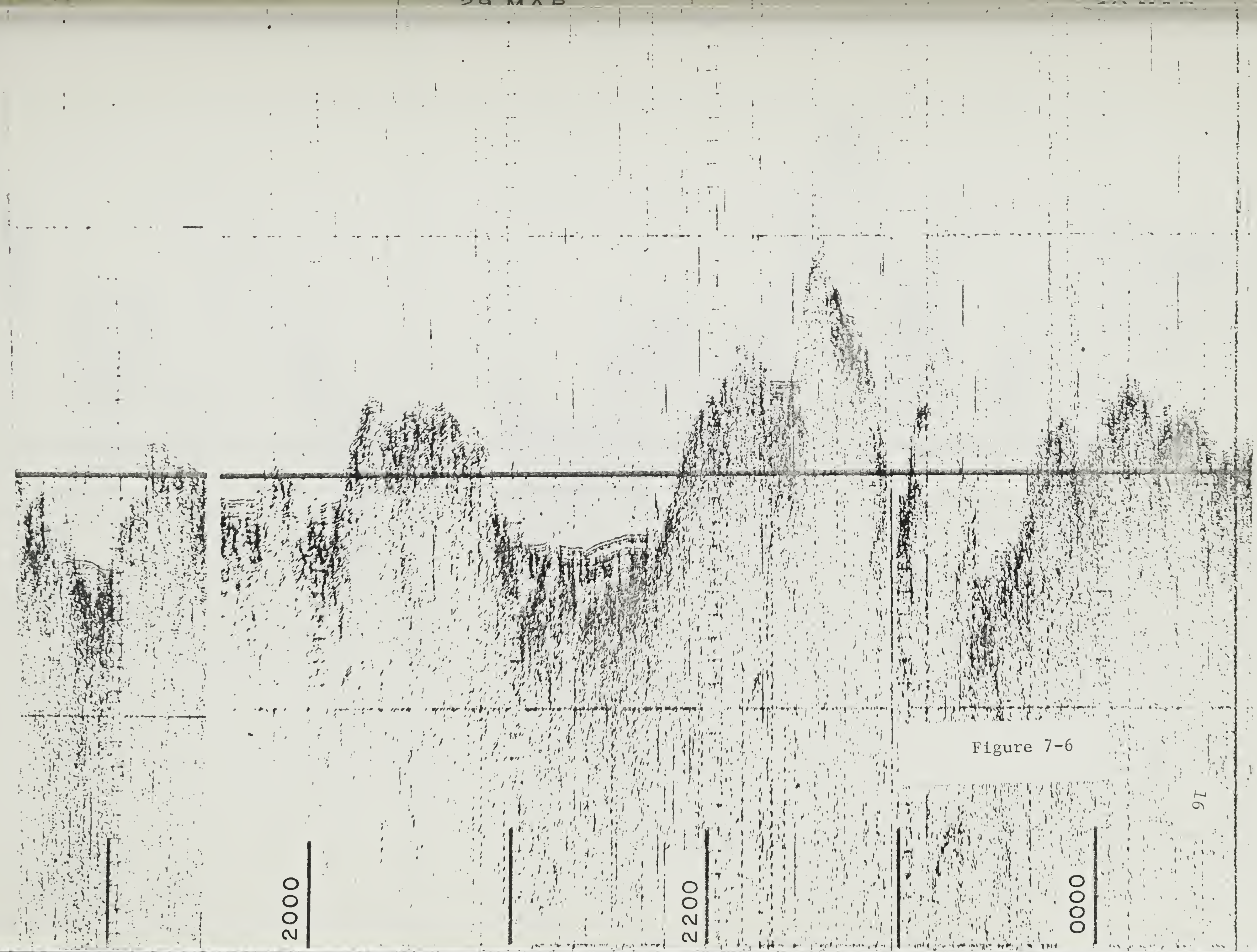

Figure 7-6

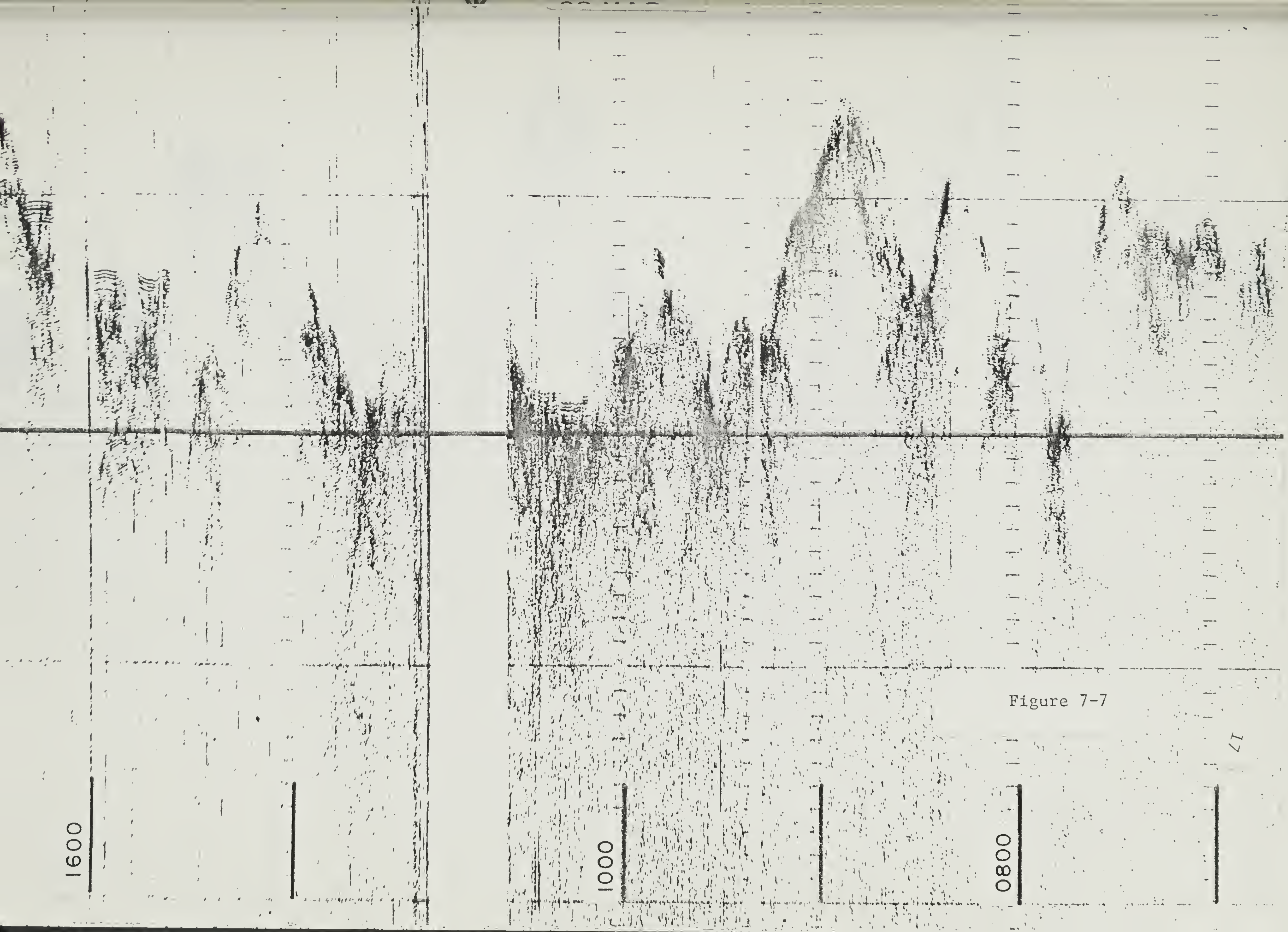

Figure 7-7

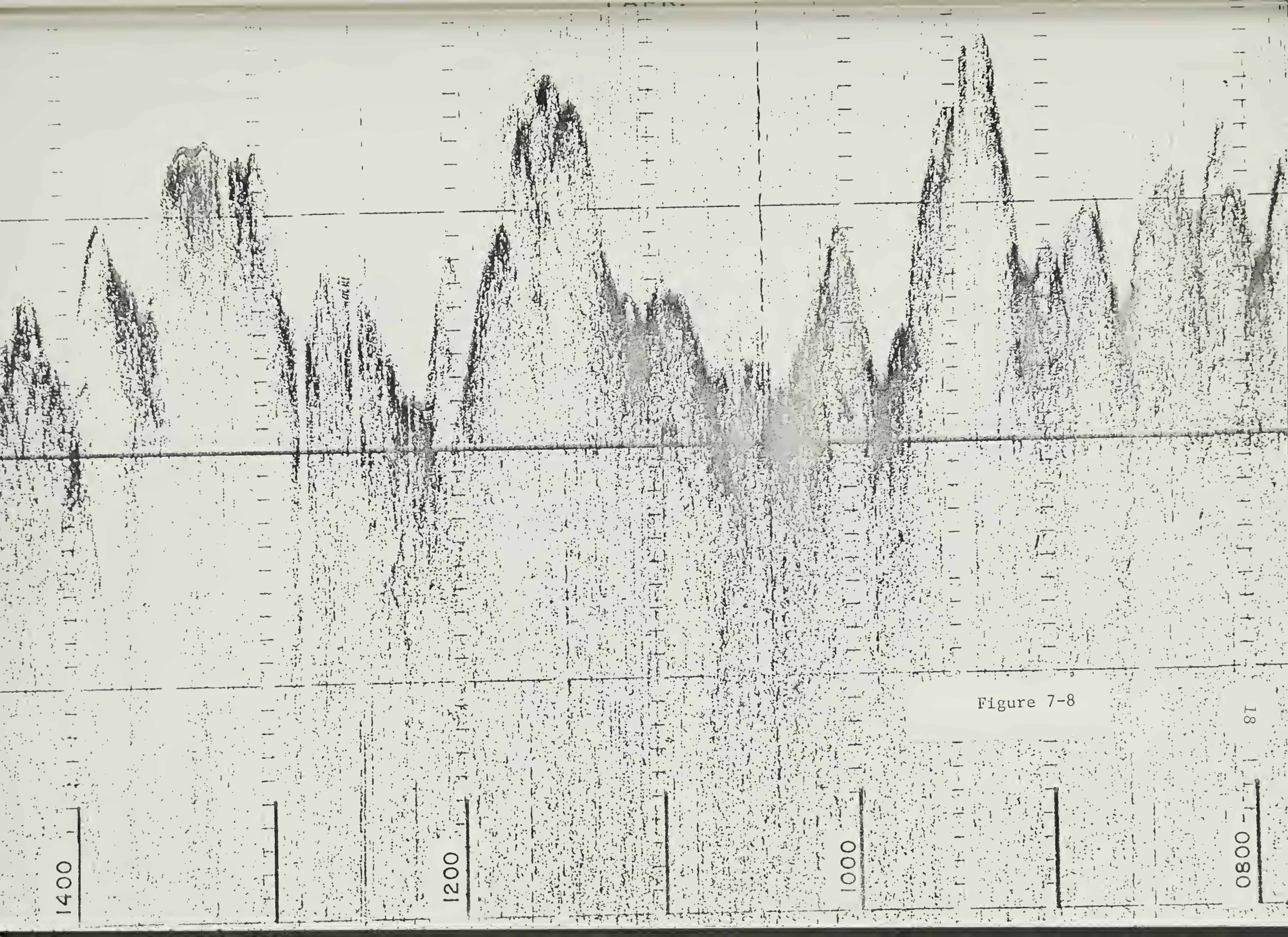

Figure 7-8

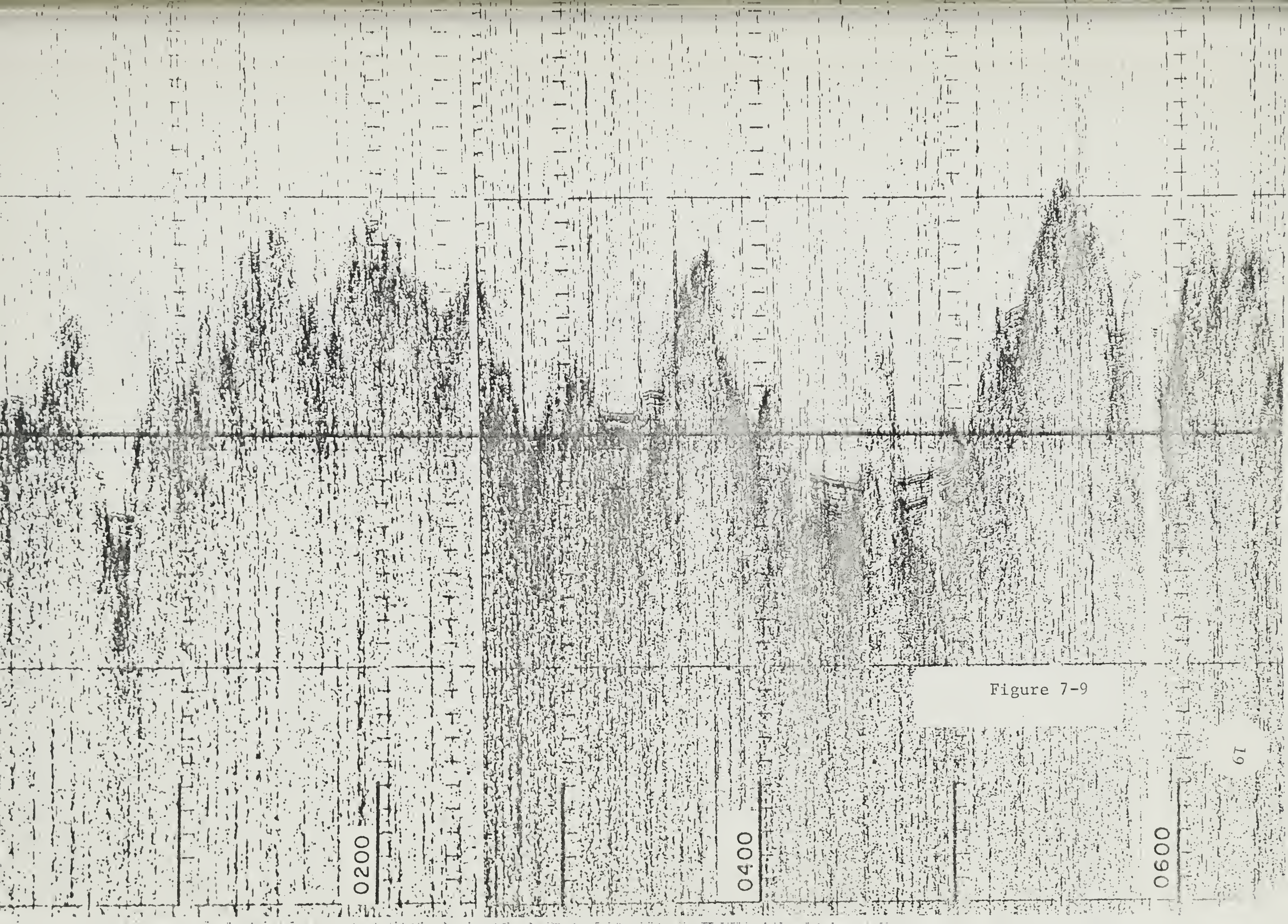

Figure 7-9

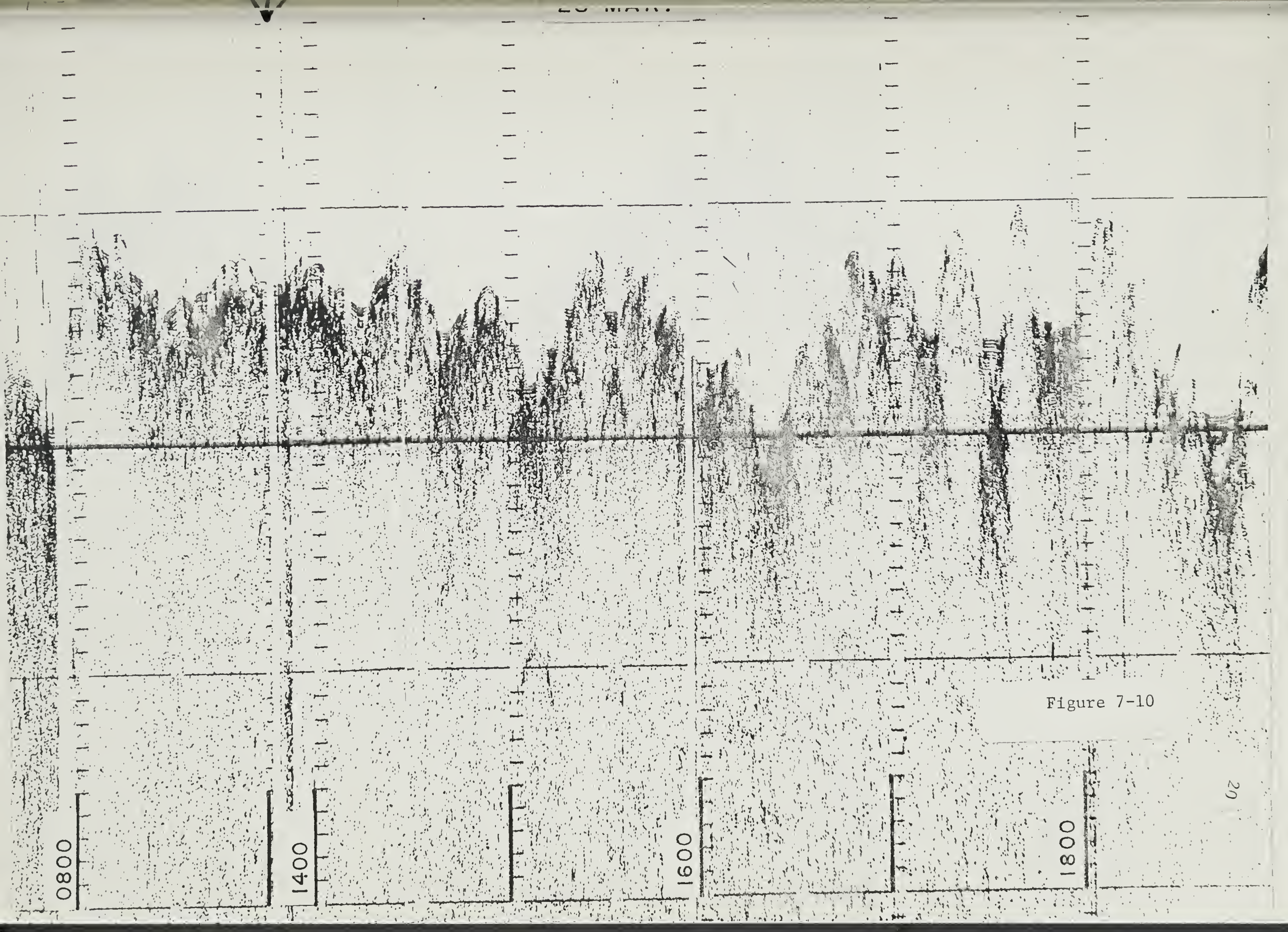

Figure 7-10

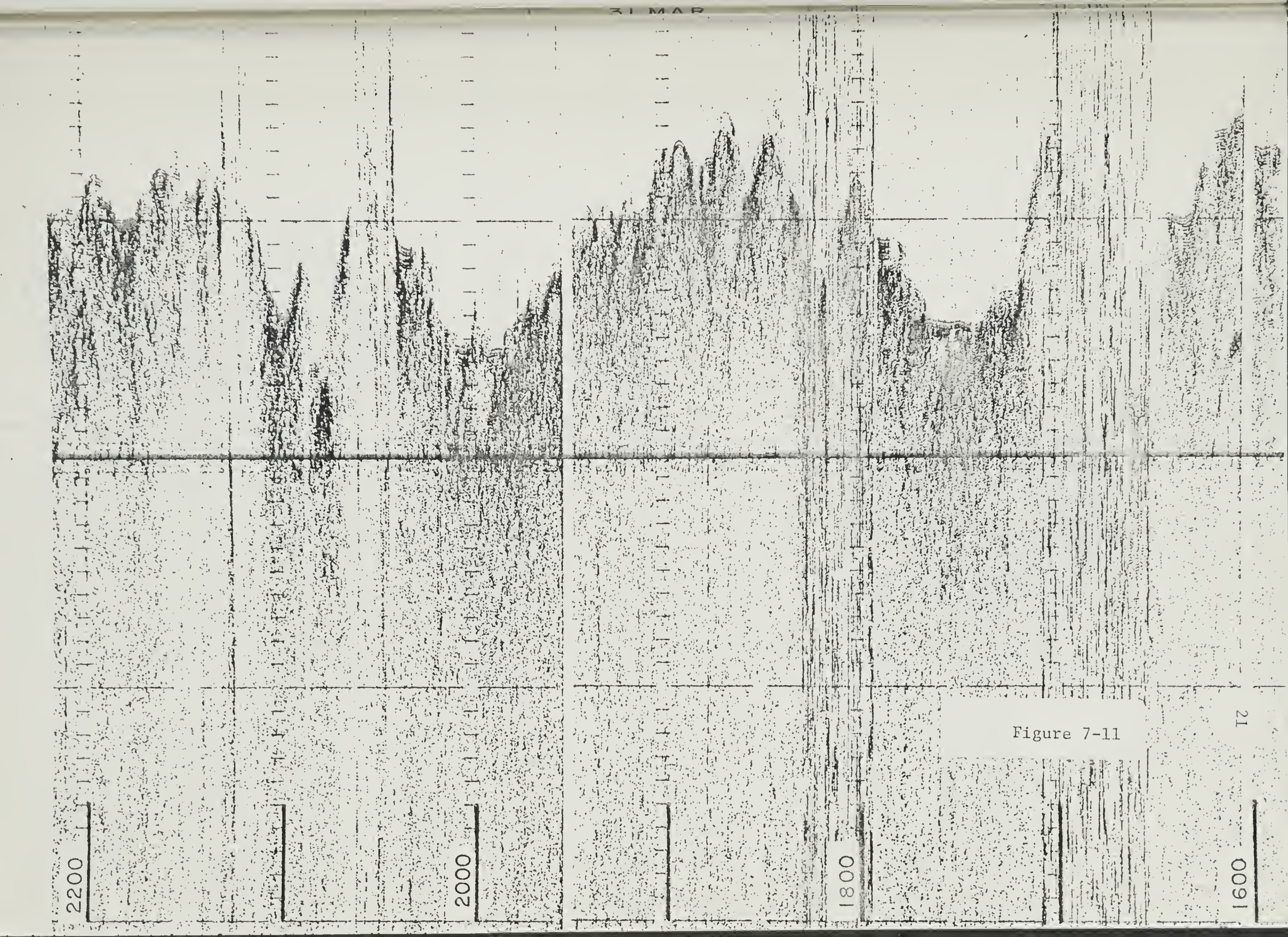

Figure 7-11

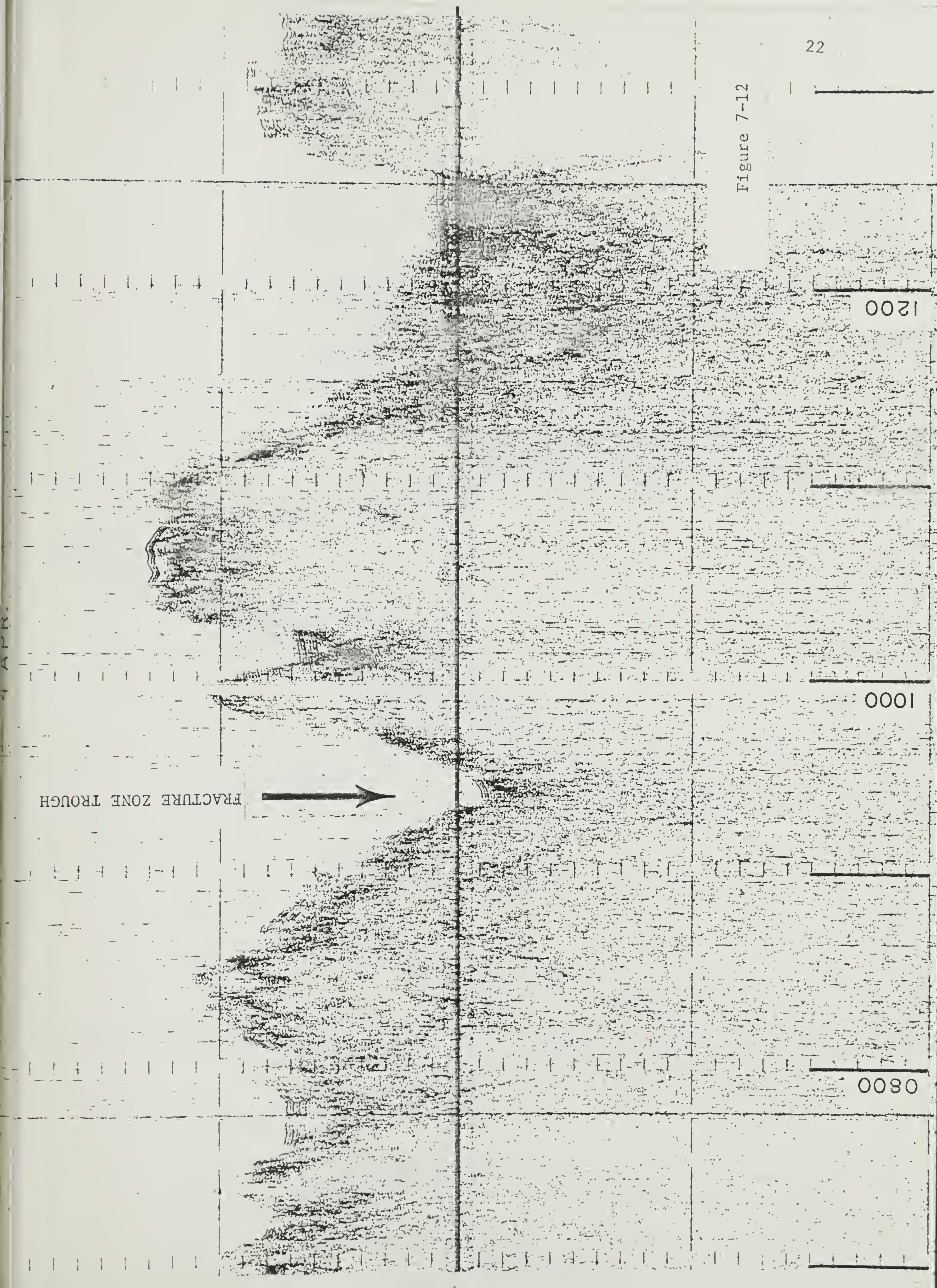

Figure 7-12

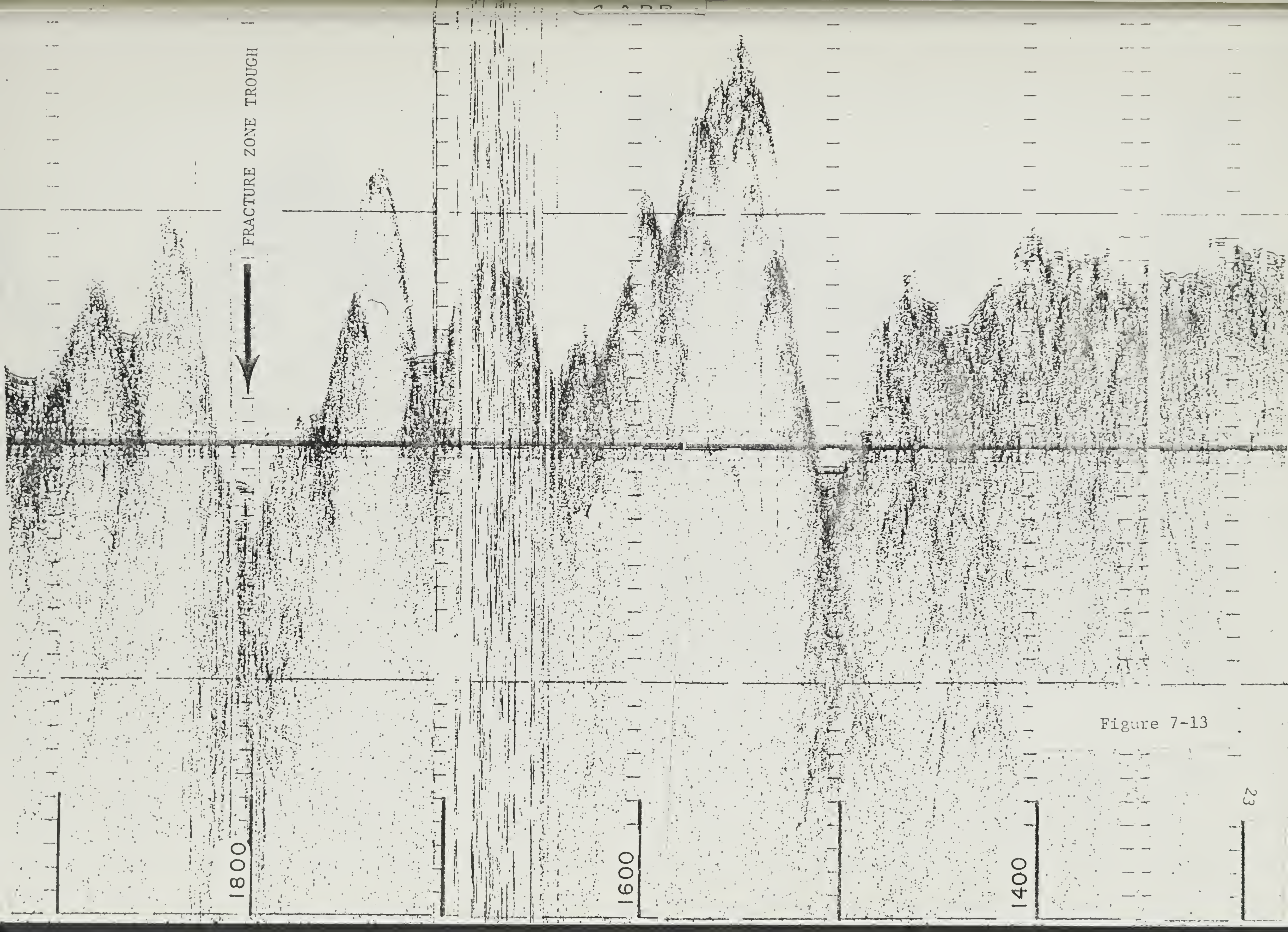

Figure 7-13

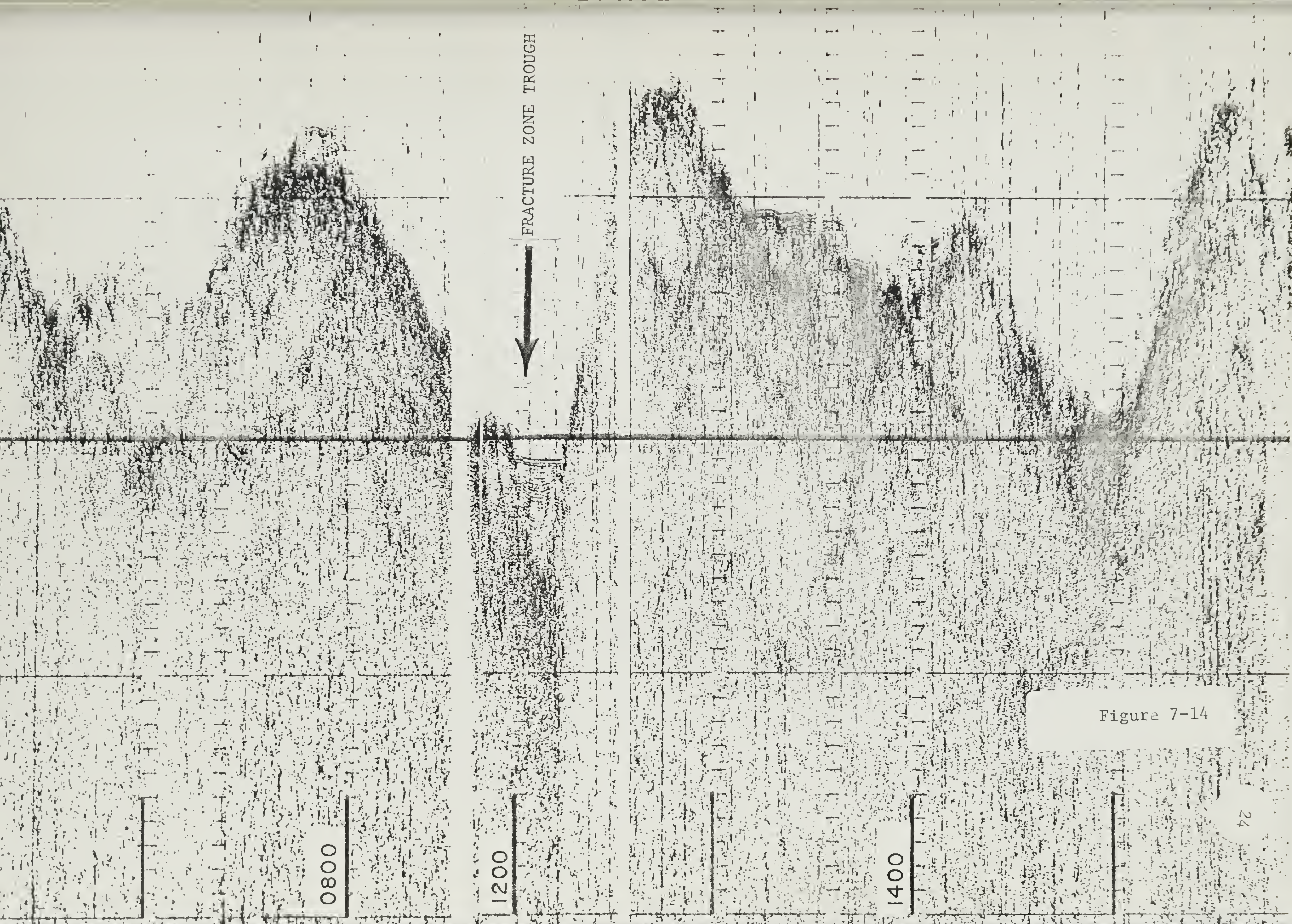

Figure 7-14

Recommendations for Drilling

If the primary objective of the IPOD drilling in this region is to drill "normal" ocean crust of the age of anomaly 13 (38 m.y.) then the logical drill site should be in the northeast region of the site survey where the topography, gravity anomalies and magnetic anomalies are well lineated and normal to the fracture zone trough. This narrows the optimum drilling location to the eastern segments of profiles 7-1 to 7-5.

We list below the closest locations to anomaly 13 on these profiles where sediment thicknesses in excess of 200 meters (>0.2 seconds of 2-way travel time) are observed [minimum sediment thickness necessary for deep drilling].

Profile 7-1 - 0300 hrs.
∿ 7 n. miles west of anomaly 13
sediment thickness in excess of 0.3 seconds
water depth 7.4 seconds

Profile 7-2 - 2310 hrs.
within 2 n. miles of anomaly 13
sediment thickness ∿ 0.2 sec
water depth 7.5 seconds

Profile 7-3 - 1805 hrs.
∿ 10 n. miles east of anomaly 13
sediment thickness ∿ 0.2 sec.
water depth 6.7 seconds

Profile 7-4 - 1235 hrs.
∿ 8 n. miles east of anomaly 13
sediment thickness ∿ 0.2 seconds
water depth 6.8 seconds

Profile 7-5 - traverses very close to axis of fracture zone - small sediment pockets observed generally less than 0.1 sec. in thickness.

Profile 7-1 is the northernmost profile. Since data does not exist to the north we do not know how near we are to another fracture zone. Since the fracture zone locations appear to be generally close spaced it would be advisable not to drill on this line.

The sediment pocket or profile 7-2 at 2310 hours appears to be the optimum drill location for site 4.

We base our decision on:

i) The sediment pocket lies within 2 n. miles of magnetic anomaly 13.

ii) It has a thickness $\approx$ 0.2 seconds of two-way travel time.

iii) The trough is located in the region where the magnetic, gravity and bathymetric trends are lineated and not offset by small fracture zones.

Acknowledgments

The International Phase of Ocean Drilling (IPOD) sponsored by the National Science Foundation is the fourth phase of the Deep Sea Drilling Project. The IPOD site survey management is situated at Lamont-Doherty Geological Observatory of Columbia University under the general supervision of Dr. Marcus Langseth. The site surveying is done under a subcontract to Scripps Institute of Oceanography.

We wish to thank the officers, crew, and scientific staff aboard R/V VEMA for their cooperation in gathering the data. In particular, the shipboard participation of Thomas Aitken (L-DGO) and Dr. Michael Purdy (WHOI) was greatly appreciated.

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Illustrations

Introduction

The purpose of this report is to present the results obtained during a geophysical survey of candidate site 3 for the International Phase of Ocean Drilling (IPOD). Site 3 is situated in the region of the oldest magnetic anomalies seaward of the Cretaceous quiet zone in the central western North Atlantic (anomalies 31 to 34; $\sim$75 to $\sim$81 m.y.b.p.). Site 3 was chosen to lie along the same synthetic flow line and same age but on the opposite side of the ridge axis as site 7 (figure 1).

Continuously recorded bathymetric, seismic reflection, gravity and magnetic measurements were obtained along the ships' track. On station coring, heat flow, camera and nephelometer stations as well as seismic sonobuoy measurements were made in select locations. The data collected on these sites are given in part A of these reports. In this report, the data will be presented primarily in the form of contour maps or profiles on a mercator projection.

Regional Setting

The Kane fracture zone in the central Atlantic ocean has an offset across its active portion of 160 km. The inactive portion from the ridge axis west to 51°W is characterized by a distinct topographic trough (Fox, et al. 1969). The Kane fracture zone has been traced farther west during this site survey to 62°W, a distance of 1700 km from the ridge crest (figure 2; Rabinowitz and Purdy, in prep.). A large change in the trend of the fracture zone is observed near 52.5°W. West of 53°W the fracture zone is characterized, in general, by a distinct sediment filled trough bounded by topographic highs. The offset across the fracture zone, in this region, as determined by offsets in the magnetic lineation pattern

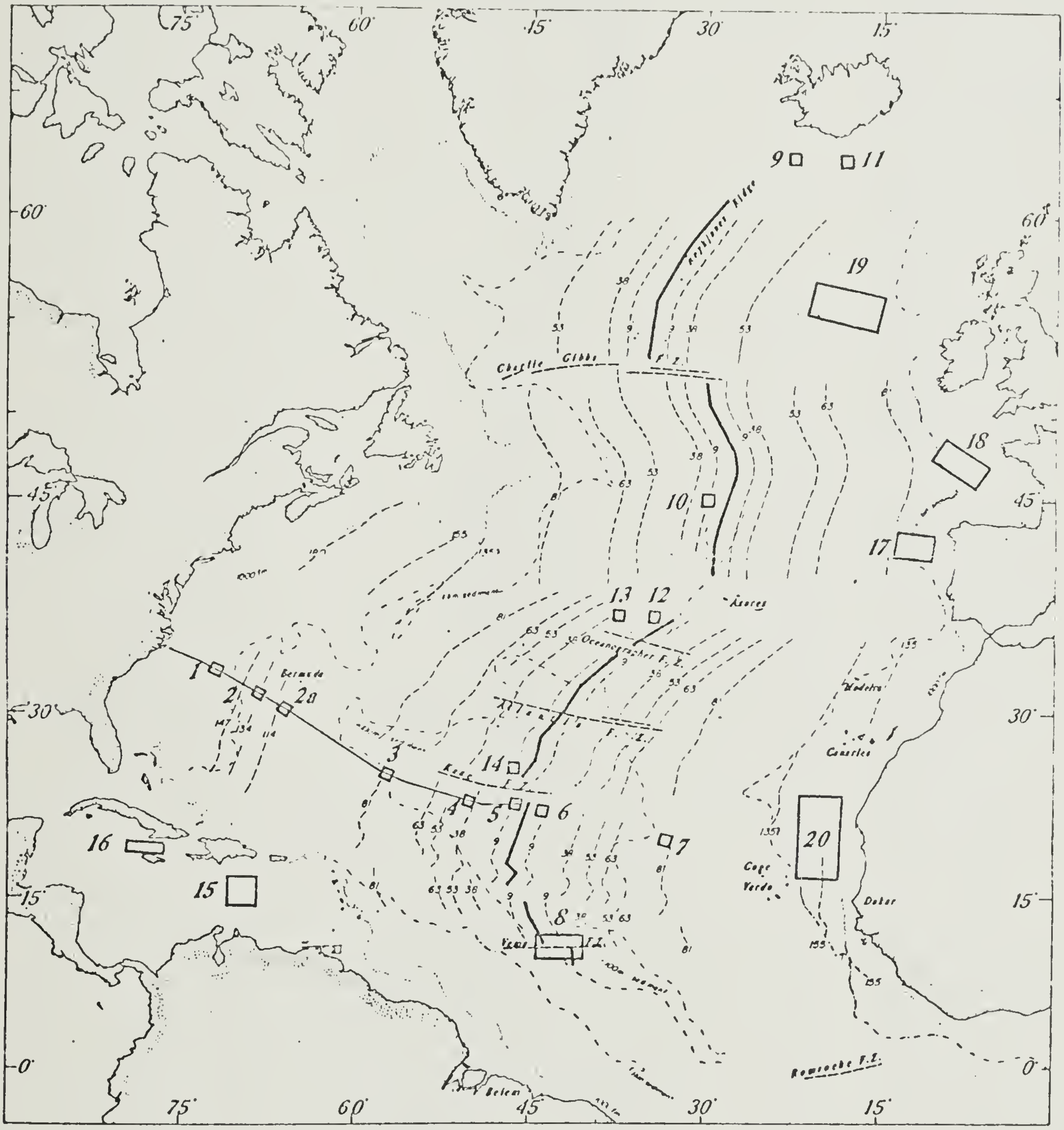


Figure 1. Proposed Atlantic drilling sites for International Phase of Ocean Drilling. Sites 3, 4, 7 and 8 were surveyed by R/V VEMA in February and March 1975.

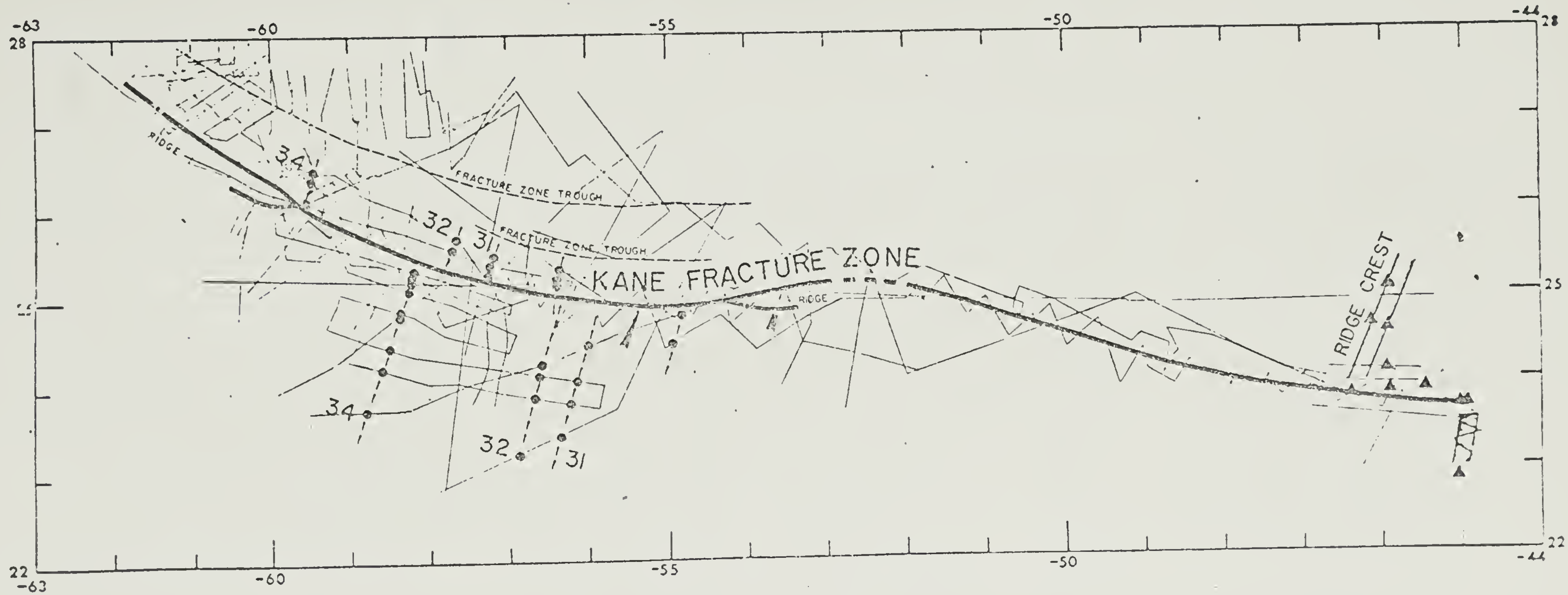


Fig. 2. Detailed location of the Kane Fracture Zone. Thick black lines denote the fracture zone trough, the location of which is uncertain between longitudes 52°W and 53°W. Triangles are earthquake epicentres, dots are recognizable lineated magnetic anomalies. Anomalies 31, 32 and 34 are shown north and south of the trough. Tracks are all those available in the data libraries of Lamont-Doherty Geological Observatory and Woods Hole Oceanographic Institution. Arrow head at 55.5°W denotes location of topographic high within the fracture zone trough.

is similar to that of the present day ridge axis (160 km). North of the Kane fracture zone a number of continuous topographic troughs and presumed fracture zones are observed. The magnetic anomalies are difficult to correlate. South of the Kane fracture zone there are no distinct continuous troughs and no observable offsets in the magnetic pattern.

Site 3 Data

The bathymetry in the site 3 area is given in figure 3. The primary contour interval is 250 meters (corrected). The 6200 m contour is given near the base of the Kane fracture zone trough.

The dominant feature is the Kane fracture zone. The nearly flat-floored trough is about 10 km wide and is characterized by depths of 6200-6250 meters. Topographic highs are observed on either side of the trough. They are most prominent on the north wall where they appear as ridge-like structures interrupted, in places, with bottom depths similar to that of the fracture zone trough. The eastern part of the survey area, south of the Kane fracture zone, is characterized by linear and rugged topography (with bottom depths ranging from $\sim$5000 to $\sim$6300 m) trending normal to the fracture zone. The relief of the topography in the western segment is somewhat less rugged (bottom depth ranging from $\sim$5700 to $\sim$6100 meters).

A free-air gravity anomaly map contoured at a 10 mgal interval is shown in figure 4. The trend in the free-air gravity anomalies are similar to those of the topography. The Kane fracture is well defined gravimetrically with free-air minima in places more negative than -50 mgal. In the eastern part of the survey area, south of the fracture zone, the gravity anomalies trend normal to the fracture zone in a similar fashion to the topography. The entire survey region is characterized by negative regional anomalies.

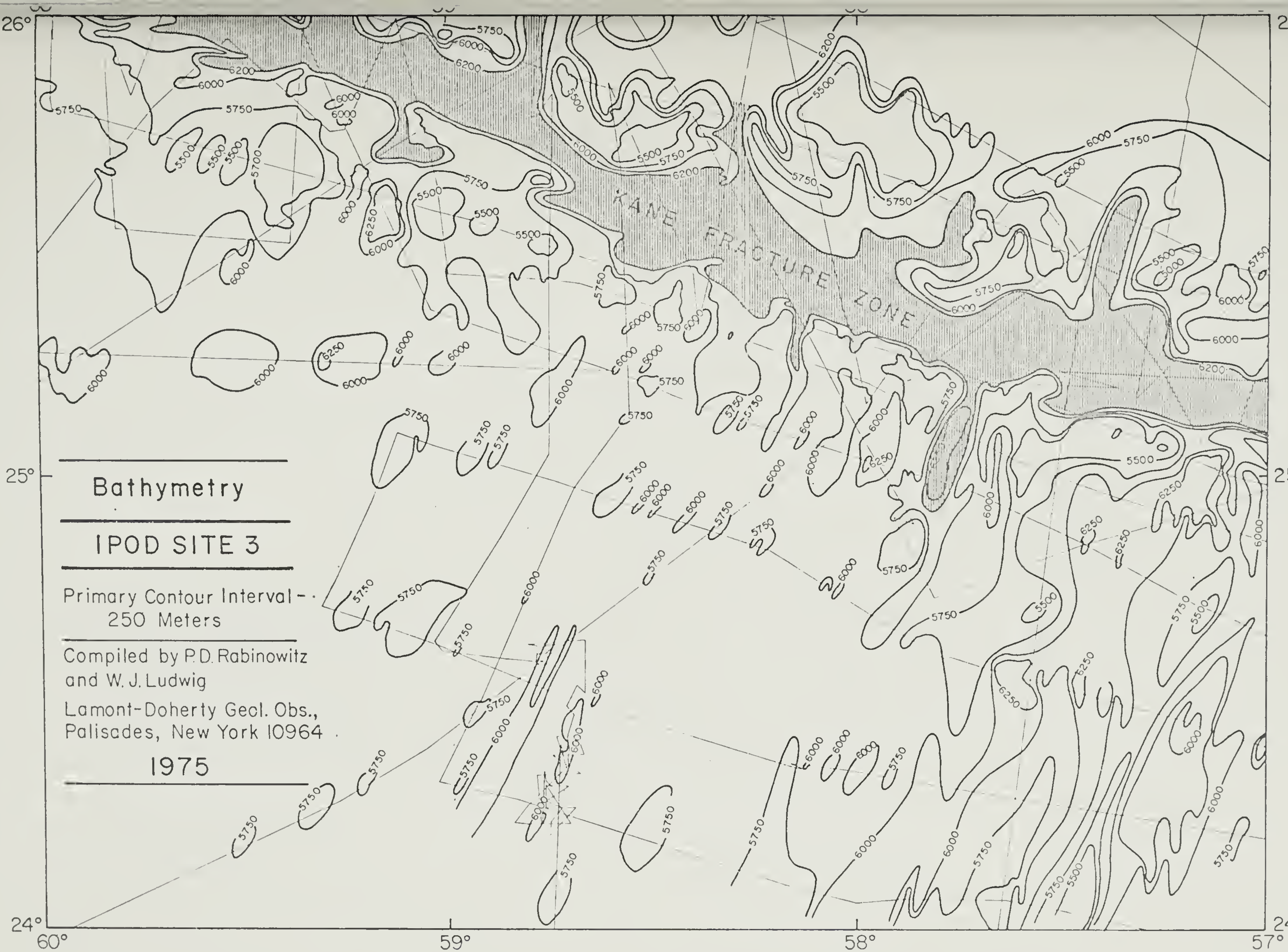


Figure 3. Bathymetry - IPOD Site 3. Primary contour interval 250 meters. The 6200 m contour is given at base of Kane Fracture Zone.

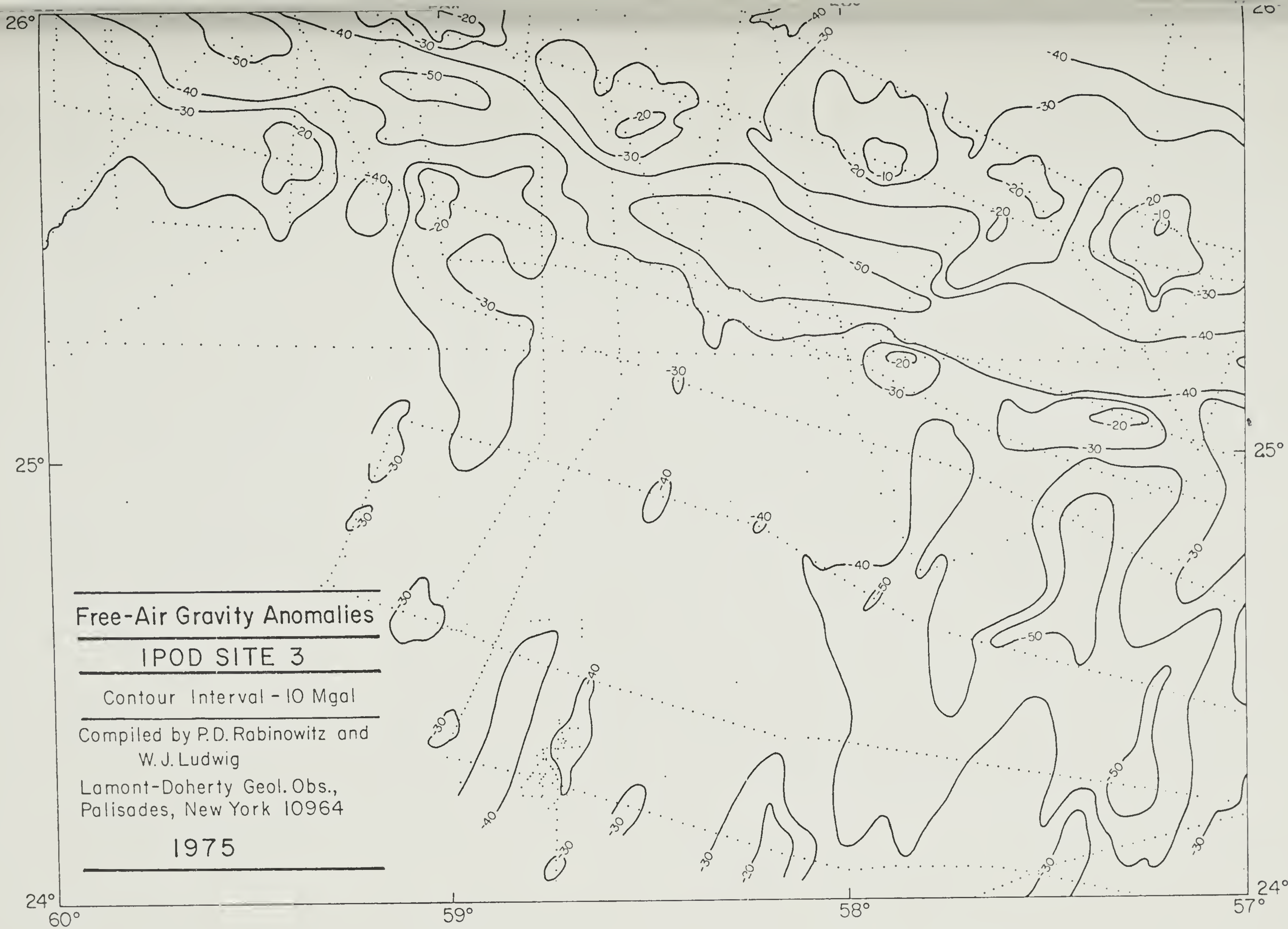


Figure 4. Free-air gravity anomalies - IPOD Site 3. Locations of gravity measurements shown as dots along ships' track.

The magnetic anomalies are shown as profiles along the ship's track in figure 5. South of the Kane fracture anomaly 34 is linear and trends normal to the fracture zone. North of the fracture zone, anomaly 34 is observed with a left lateral offset of about 160 km (not in survey region; see figure 2). Anomalies 31 and 32 are observed in survey region north of the Kane fracture zone. South of the fracture they too are observed with a left lateral offset of 160 (see fig. 2).

The ships navigation and seismic profiler records are shown in figures 6 and 7-1 to 7-10, respectively. The profiler records which are keyed to the navigation illustrate the more rugged nature of the sea floor topography in the eastern section of the survey area. In this region sediments are generally observed in troughs. In the western part of the survey area where the topography is generally smoother we observe a thin veneer of sediment ($\sim$ 0.1 to 0.2 seconds of two-way reflection time) overlying basement.

The results of three sonobuoy stations are given in figure 8 and Table 1. These sonobuoys were shot west of anomaly 34 (see navigation, figure 6). The cover of sediment at this site is too thin to resolve interval velocities. The velocity in the sediments is assumed to be 1.8 km/sec, and the refraction intercept of the basement layer is used to compute sediment thicknesses. The results show that the sediment layer is 1/20th to 1/28th as thick as the water layer.

Refraction results from Layers 2B and 2C, among the three sonobuoys recorded, are in excellent agreement. The velocities from Layer 3 are not in good agreement, but the arrivals are strong and well-developed on the records. We believe that the discrepancy arises from dip of the layers. The 4.7 km/sec velocity measured for -80 m.y. old crust indicates that the slow-speed Layer 2A of velocity near 3.5 km/sec is not present or that it

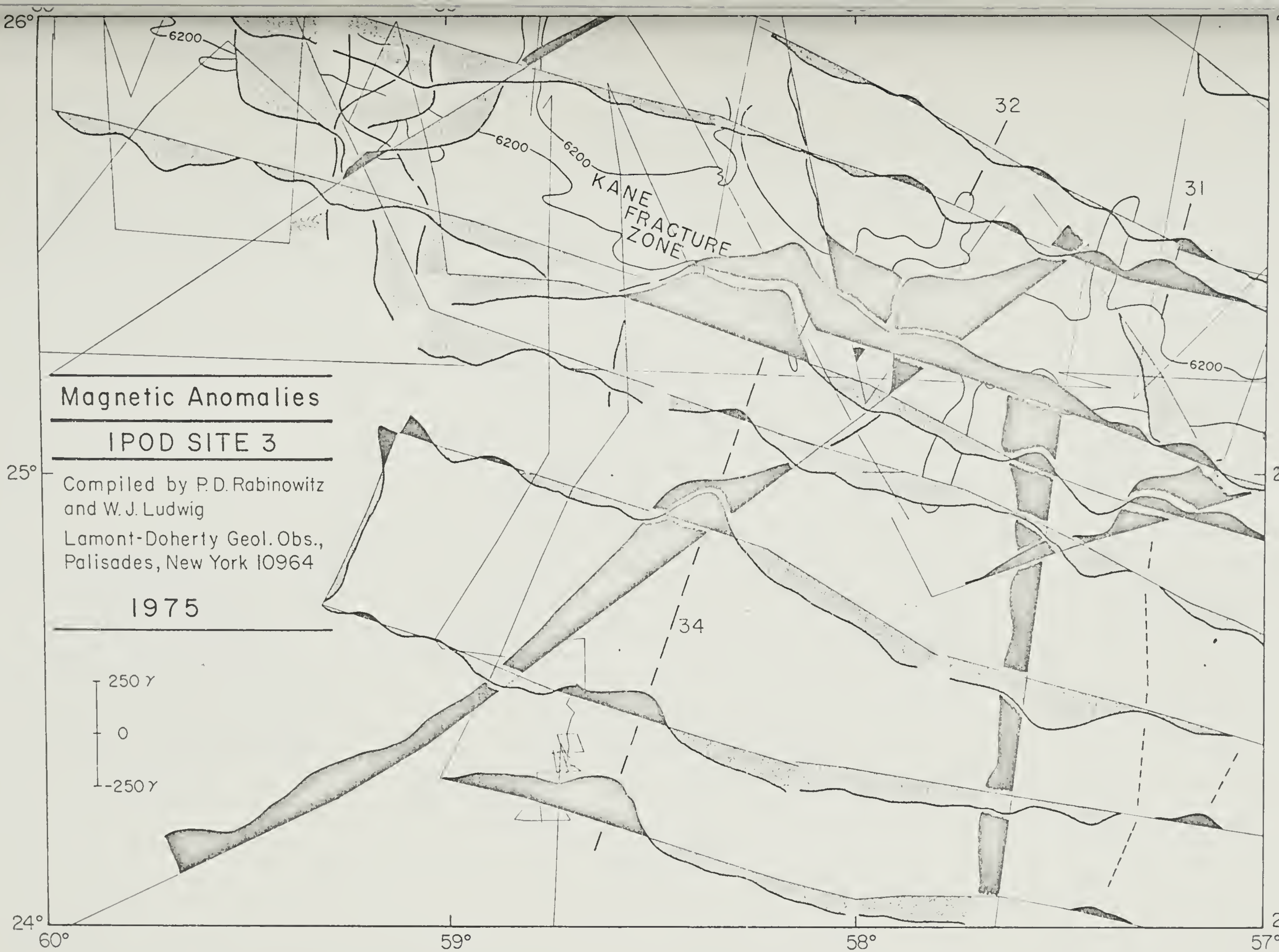


Figure 5. Magnetic anomalies - IPOD Site 3. Solid lines show locations of ships' tracks where additional magnetics data is available.

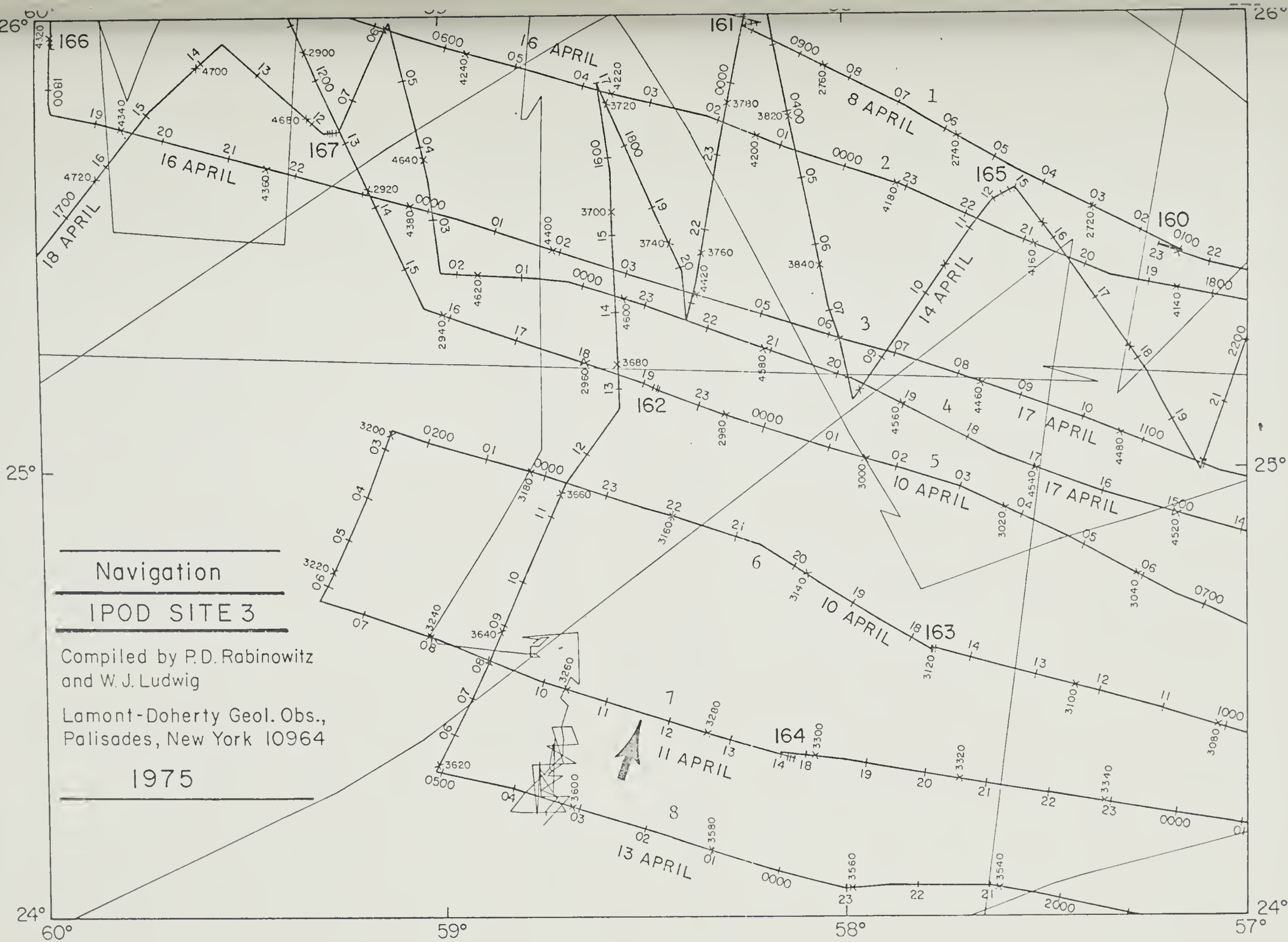


Figure 6. Navigation - IPOD Site 3. Every hour as well as every 20 n.m. is annotated for VEMA cruise 3207. Nos. 160-167 are ship stations. Solid lines with no annotations are additional cruises in area. The numbers 1 to 8 are locations of seismic records given in figure 7. Arrow points to recommended drilling location.

has been sufficiently modified as to be undetectable (see Houtz and Ewing, 1975).

TABLE 1

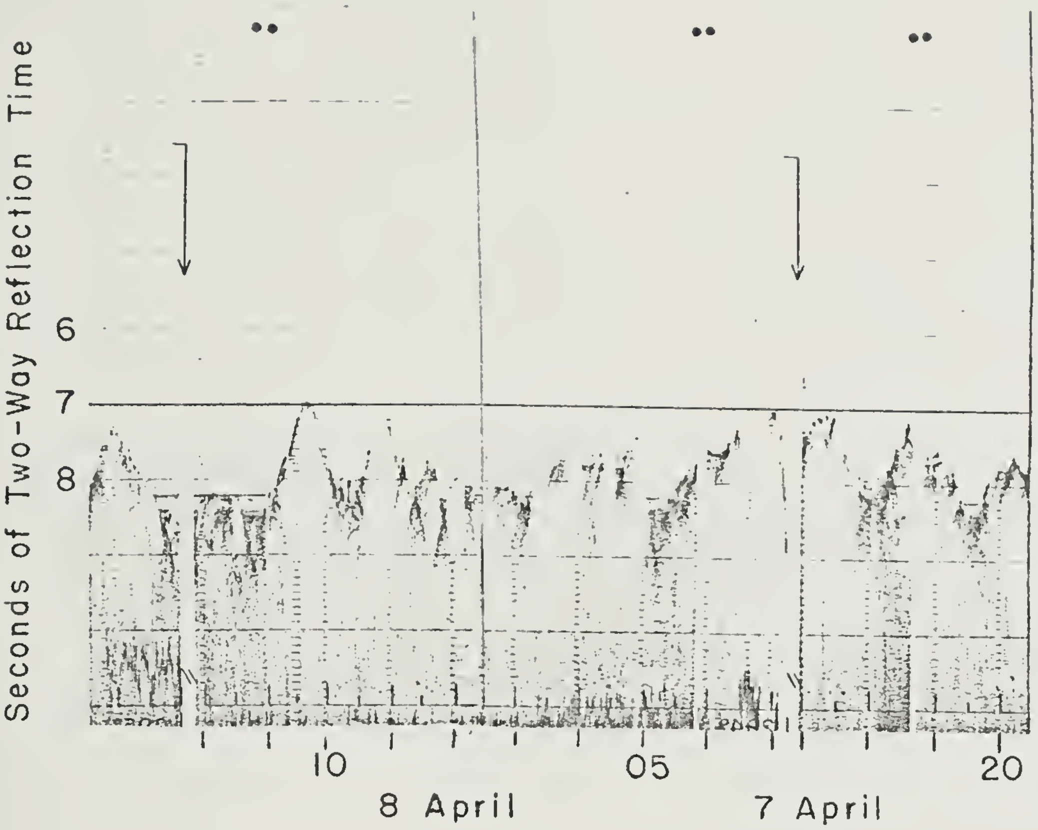
	H_1	H_2	H_3	H_4	V_2	V_3	V_4	V_5
50V32	5.61	.28	.49	1.55	(1.8)	4.70	6.25	6.70
51	5.73	.21	.84		(1.8)	4.75	6.00	
53	5.88	.30	.60	1.60	(1.8)	4.70	6.15	7.10

References

Fox, P. J., Pitman, W. C. III, and Shephard, F., Crustal plates in the Central Atlantic: Evidence for at least two poles of rotation. Science 165, p. 487-489, 1969.

Houtz, R. and J. Ewing, Upper crustal structure as a function of plate age. Jour. Geophys. Res., (in press).

Figures 7-1 to 7-8 - Seismic profiler records for IPOD Site 3. Vertical scale in seconds of two-way reflection time (each horizontal line is equal to one second). Heavy horizontal line is at 7 seconds. Local ship's time is given for keying to navigation (figure 6). Arrows with S-prefix give location of ship's stations. Heavy arrow on figure 7-7 shows location of optimum drill site.


Seconds of Two-Way Reflection Time
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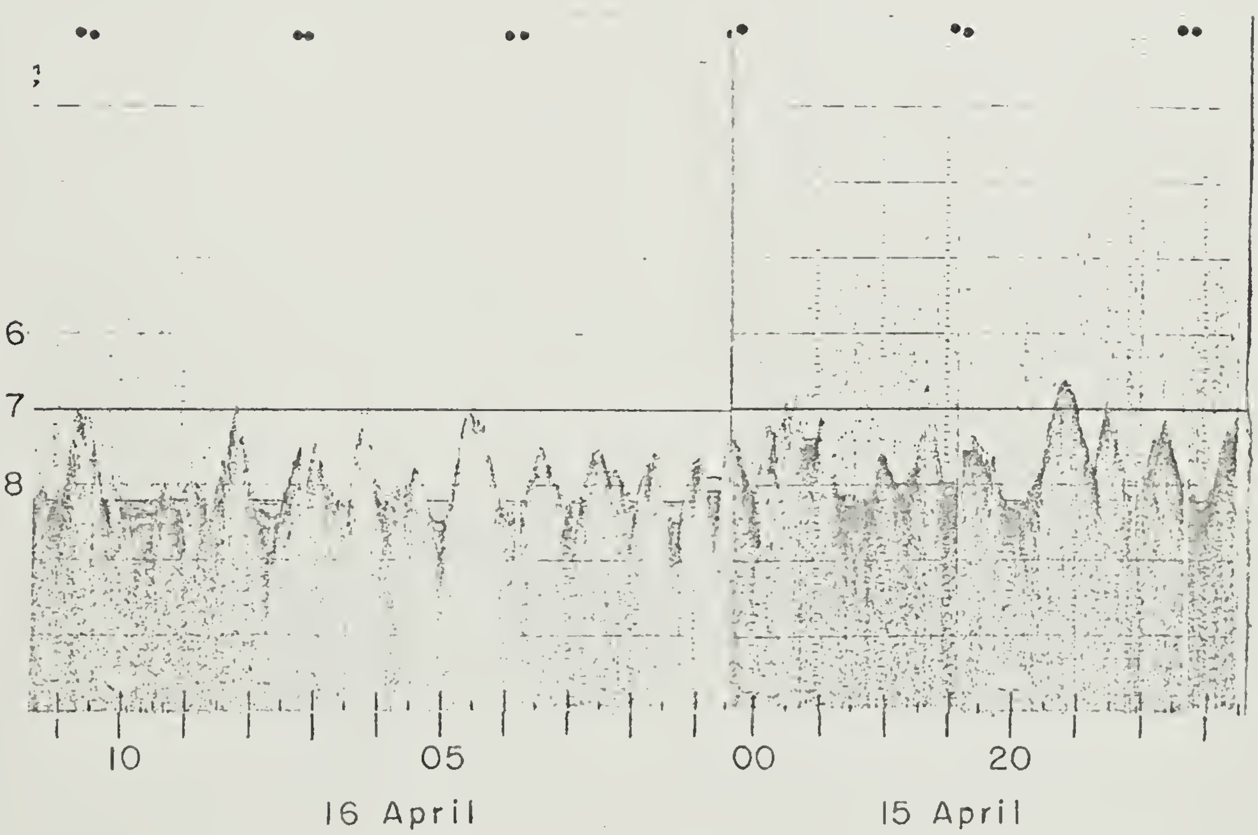
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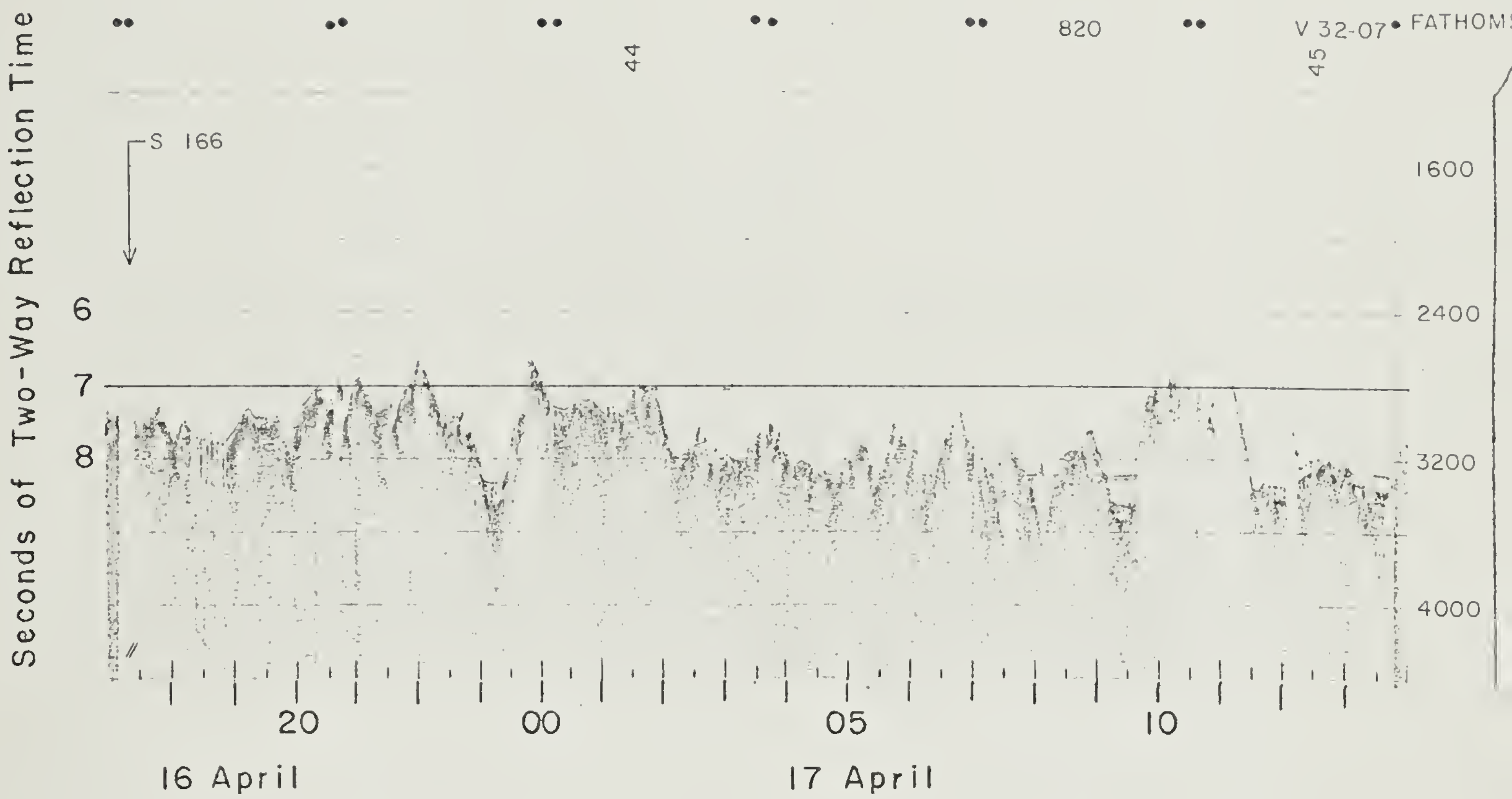

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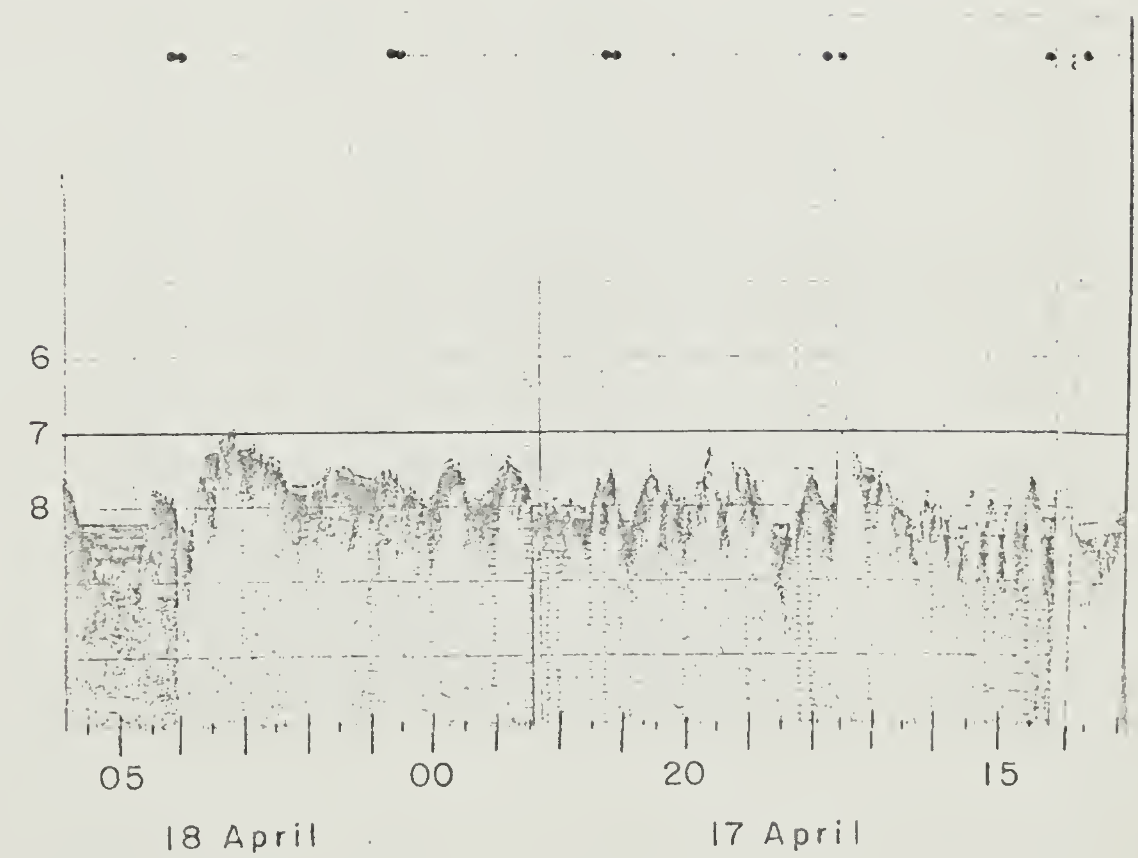

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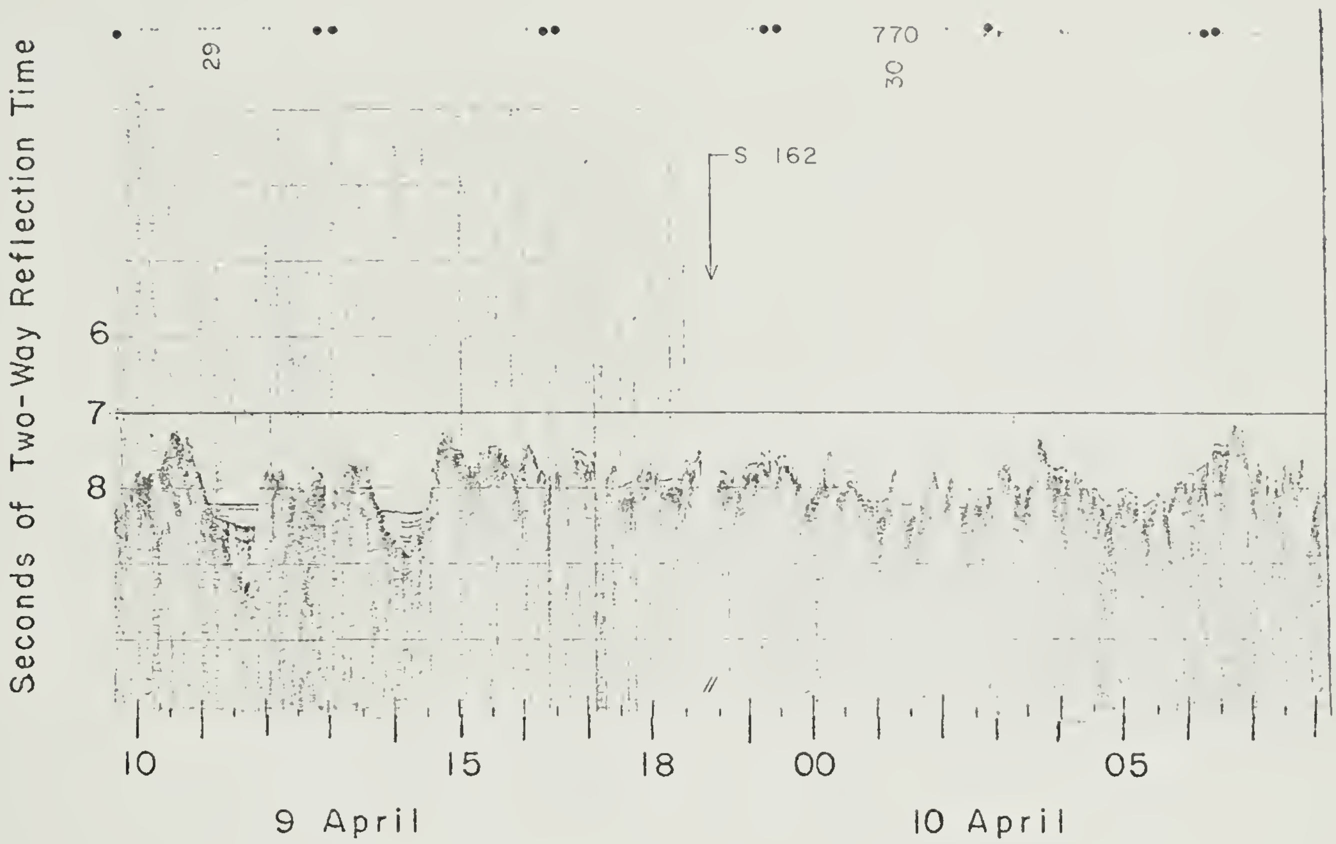

Seconds of Two-Way Reflection Time
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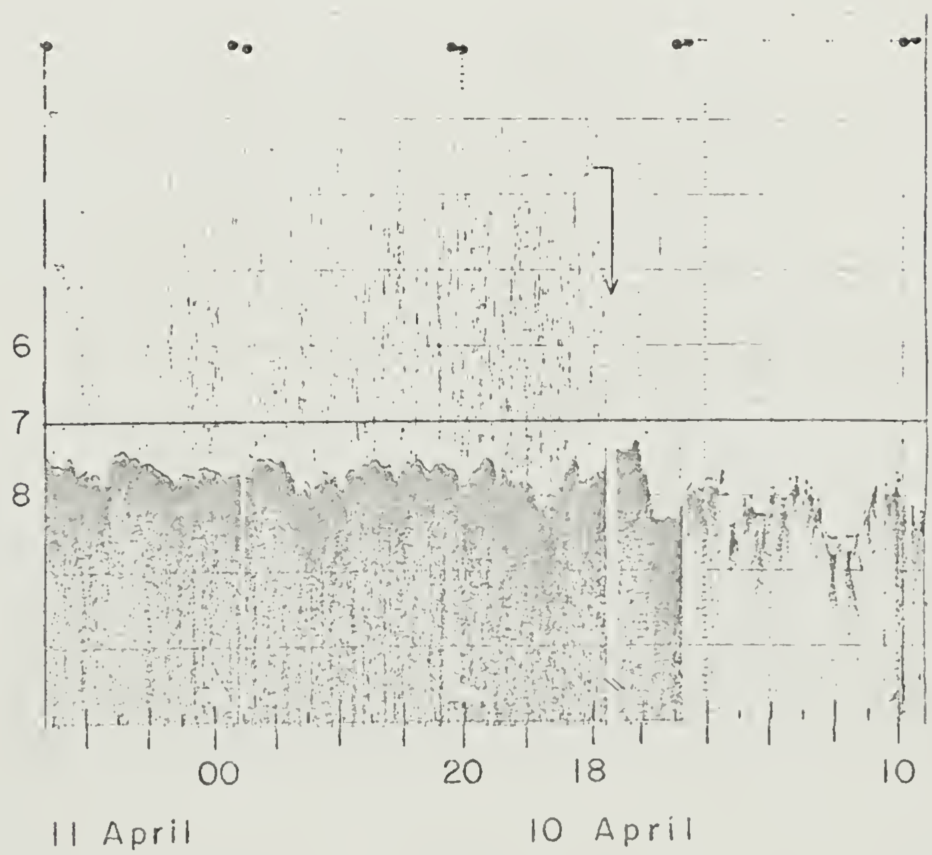

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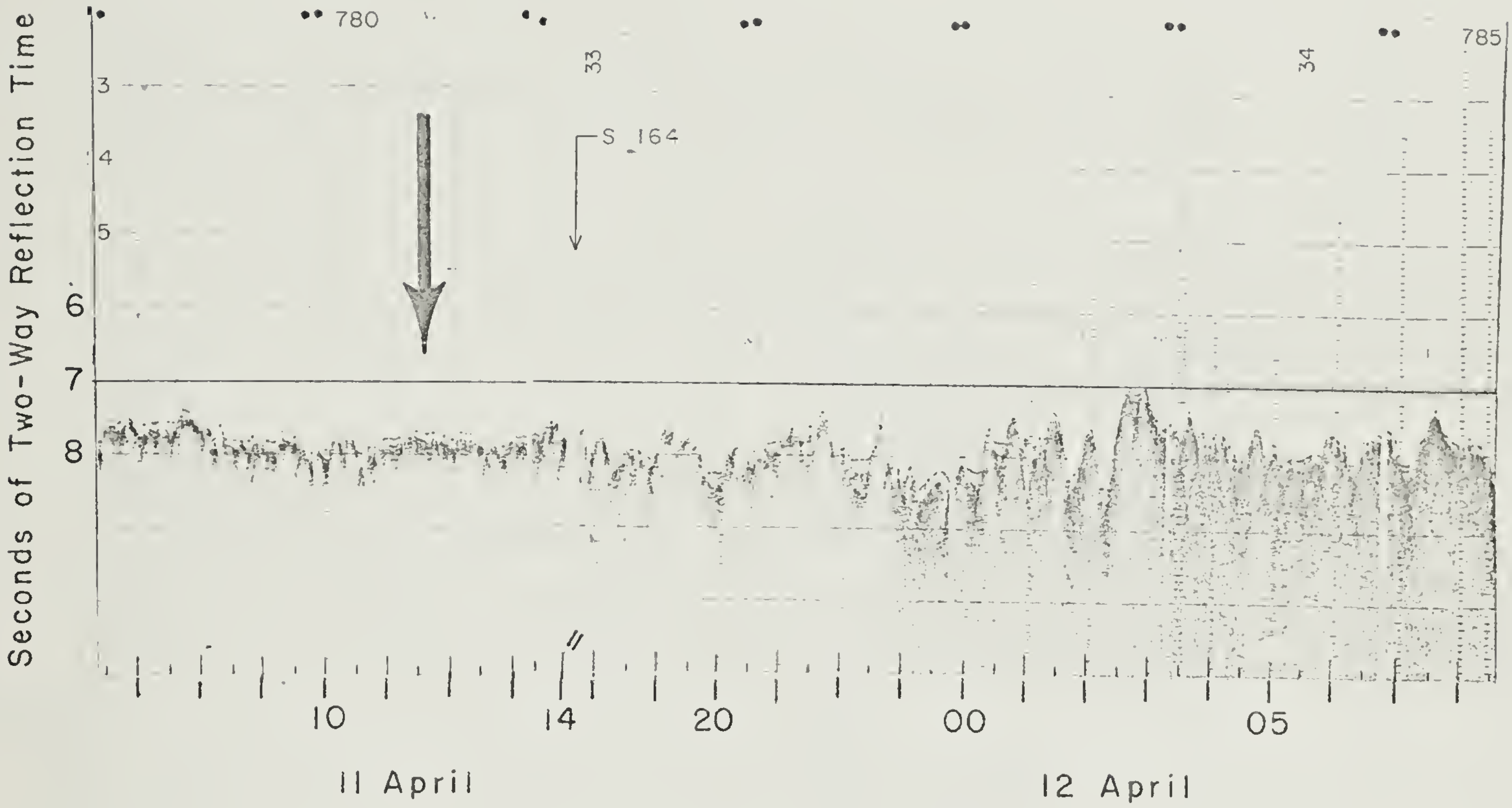
Seconds of Two-Way Reflection Time
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12 April

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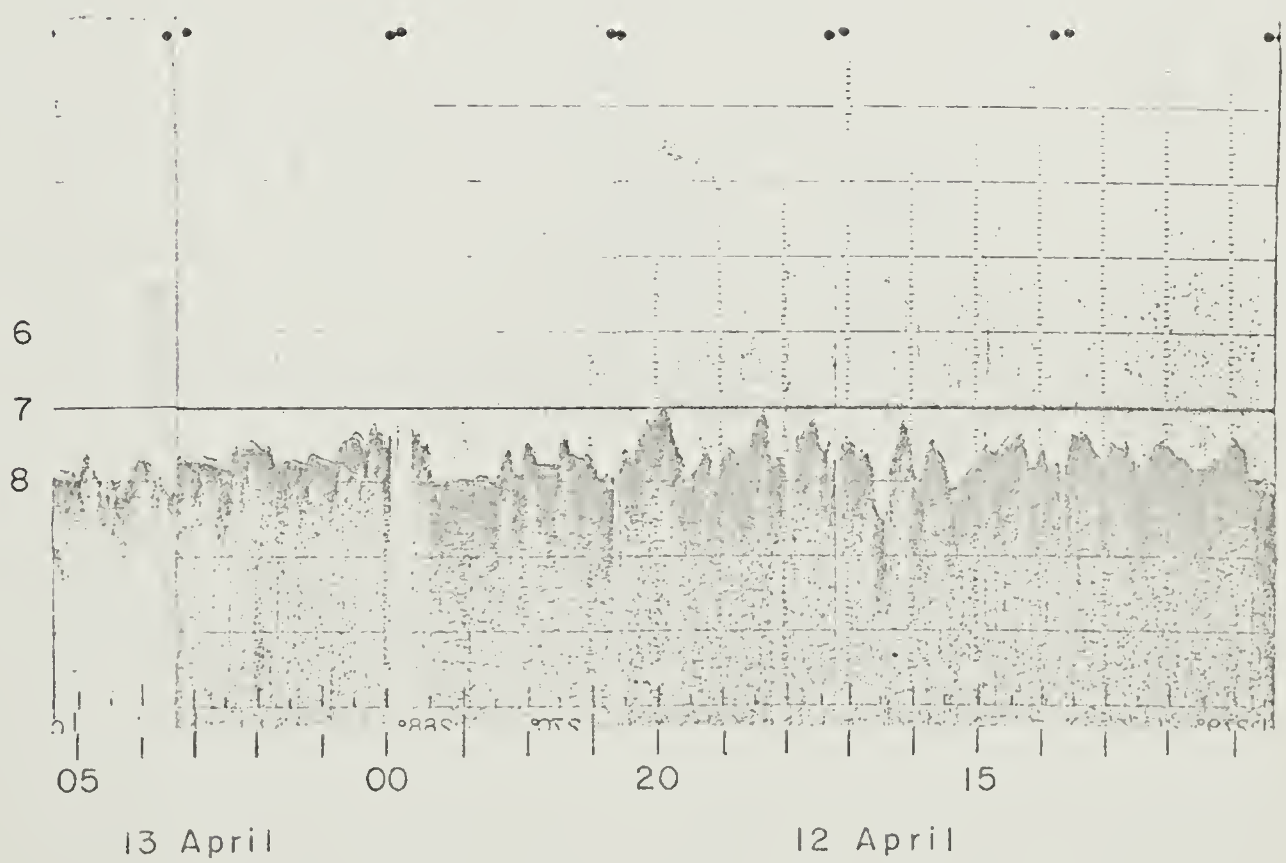
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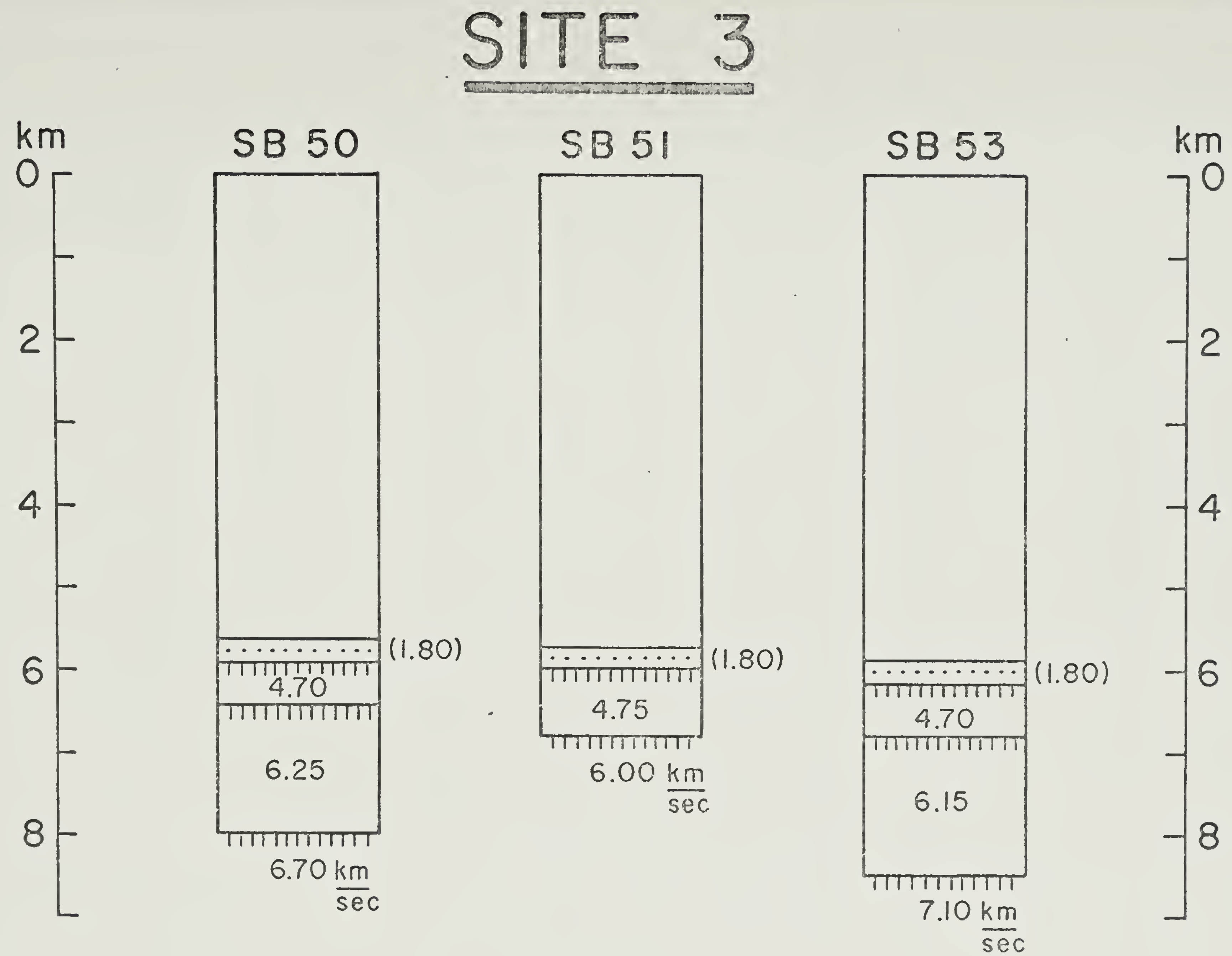

Figure 8. Sonobuoy crustal sections for IPOD Site 3. Numbers in brackets are assumed velocities.

Recommendation for drilling

Based on our data we recommend drilling at latitude 24° 28'N and longitude 58°31'W for the following reasons:

i) This location is situated on magnetic anomaly 34 and is at a "safe" distance south of the major Kane fracture zone.

ii) No recognizable offsets are observed in either the magnetic anomaly pattern or on the bathymetry in this region.

iii) An adequate sedimentary section is present (0.15 seconds of two-way travel time).

iv) Seismic sonobuoy results obtained to west of this location yield velocities and thicknesses typical for crust of the age of anomaly 34.

Acknowledgments

The International Phase of Ocean Drilling (IPOD) sponsored by the National Science Foundation is the fourth phase of the Deep Sea Drilling Project. The IPOD site survey management is situated at Lamont-Doherty Geological Observatory of Columbia University under the general supervision of Dr. Marcus Langseth. The site surveying is done under a subcontract to Scripps Institute of Oceanography.

We wish to thank the officers, crew, and scientific staff aboard R/V VEMA for their cooperation in gathering the data. In particular, the shipboard participation of Thomas Aitken (L-DGO) and Dr. Michael Purdy (WHOI) was greatly appreciated. We also wish to thank Ms. Lois Ongley and Dr. Marcus Langseth for compiling Appendix 1.

APPENDIX

GEOTHERMAL MEASUREMENTS AT SITES 3 AND 4

Prepared by: L. K. Ongley and M. G. Langseth

GEOTHERMAL MEASUREMENTS AT SITES 3 AND 4

*

Introduction

Sixteen heat flow measurements were attempted on R/V VEMA cruise 32, leg 7, beginning in Bridgetown, Barbados and ending in San Juan, Puerto Rico. These measurements were done as part of the Lamont - Doherty Geological Observatory's site surveys for IPOD.

A standard Ewing thermograd, with six thermistor sensors (five sediment probes and one water probe) was used to measure the thermal gradients. The instrument is described in Gerard et al. (1962) and Langseth (1965). A needle probe and strip chart recorder were used to measure the thermal conductivity. Von Herzen and Maxwell (1959) describe the technique.

The geothermal data collected on this cruise are summarized in Table 1. The temperature data, for each station, are given in the Appendix. There are 90 other heat flow values from previous stations in the surrounding area. These data are listed in Tables 2 and 3.

Site #3

Four new measurements were made at IPOD Site #3. The heat flow values at these and the other nearby stations are shown in Figure 1. The data in this area are approximately log-normally distributed about a median of 1.33 HFU (see Figure 2). The heat flow values can be divided into three groups: 1) the bulk of the values lying between 1.1 HFU and 1.6 HFU, 2) those less than 1.0 HFU, and 3) those greater than 1.6 HFU.

The bottom topography consists of relatively low amplitude, northwest trending valleys and ridges (see Figure 3, which shows some typical seismic profiler records in the area). The valleys are commonly flat-floored because they are filled with sediments. These turbidite sediments are continuous with those in the Hatteras Abyssal Plain. Typically, the sedimentary thickness is about 0.2 to 0.4 seconds (two-way reflection time). The sedimentary cover on the ridges is variable, but generally thinner than in the valleys. It's thickness ranges from nearly undetectable (profiler record 759, Station 5) to 0.1 second (profiler record 774, Station 17, see Figure 3). The anomalously high and low heat flow values are principally measured on the elevated areas. These are the values that provide most of the observed variability in the data.

The mean heat flow for the area, shown in Figure 2, is 1.3 HFU

(standard deviation of 0.38). Based on the magnetic chronology (Pitman and Talwani, 1972), Site #3 is nearly the same age as IPOD Site #7, (Ongley and Langseth, 1975) about 75 million years.

Sclater and Francheteau (1970) statistically analyzed mean heat flow values versus age of ocean crust. They found mean heat flow values of 1.43 HFU and 1.42 HFU in the North Pacific and South Atlantic Oceans. The mean heat flow for Site # 7 is 1.41 HFU. The mean for the area around Site # 3 is somewhat lower, but the difference may not be significant.

Site #4

Site # 4 is located in a relatively rough, lightly sedimented area on the western flank of the Mid-Atlantic Ridge. Three new temperature gradient measurements were made in this area (see Figure 4). The three heat flow values, based on these gradients, are in good agreement and have a mean of 1.40 HFU. These measurements were made in rough terrain (see Figure 5). There is a high probability of local, near-surface disturbances at these stations and they may not be representative of the regional heat flow (see, for example, Langseth et al., 1966). Figure 6 is a histogram of all values shown in Figure 4. It reveals much variability, but most of the values fall within two ranges: 1) $0.5 < Q < 0.8$, and, 2) $1.1 < Q < 2.0$. The very high values ($>$ 3.0 HFU) were measured very close to the ridge axis. It has recently been suggested that, the low heat flow values ($\sim$ 1.0 HFU) in regions of sparse sedimentary cover represent only part of the

true heat flow because a significant part of the heat escapes by water flow within the fractured oceanic crust (Lister, 1972). If this is true, then values lower than 1.0 HFU should not be included when determining the mean regional heat flow.

The stipled area in Figure 4 is a band of oceanic crust, formed 28 to 48 m.y.b.p. by the seafloor spreading model and identification of magnetic anomalies. The ten measurements in this band provide a slightly larger sample than those within the Site #3 area. They show the same bimodal grouping seen in Figure 6. If we exclude the four values less than 1.0 HFU, the average heat flow is 1.53, not significantly different from the mean of the three values in the Site # 4 area. This adds some credibility to these values as being representative of the regional heat flow.

Sclater and Francheteau (1970) found means of 1.61 and 0.69 for the North Pacific and South Atlantic Oceans respectively for crust 38 m.y. old. It is likely that the low Atlantic mean (which is based on only five values) is dominated by low values, as discussed above. However, the Pacific mean of 1.61 is in good agreement with the 1.53 we deduce for this region of the Atlantic.

Thus, our best estimate of heat flow in this region is 1.5 HFU although large local variability is to be expected.

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TABLE 1

VEMA CRUISE 32 DATA AT SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow (HFU)	Evaluation	T'Grad
22°51.5'	50°32.8'	4749	610	3	0.74	2.09	1.55	6	11
23°08.4'	50°23.5'	5171				1.93			12A
23°07.3'	49°44.2'	5143				1.83			12B
23°27.5'	50°12.2'	4918	592	4	0.66	2.01	1.33	6	12
23°27.8'	50°14.1'	4914	552	4	0.654	2.03	1.32	10	13
23°12.6'	50°12.6'	4914				1.85			14
25°28.9'	57°10.7'	5300	616	4	0.434	1.80	0.78	8	15
25°59.0'	58°13.3'	6249	617	3	0.57NL	1.90	1.08	6	16
24°35.8'	57°47.0'	5610	615	4	0.675	1.85	1.25	7	17
24°21.5'	58°08.5'	6034	356	3	1.4	1.73	2.4	6	18

P = penetration into sediment, N = number of probes in the mud, NL = non-linear gradient.

TABLE 2

NON-LAMONT DATA IN THE VICINITY OF SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow (HFU)	HF Station #
ATLANTIS 282[1]								
25°29'	64°34'	5680			0.57	1.92	1.09	15
28°54'	64°39'	4900			0.61	1.81	1.11	22
ATLANTIS II 31[2]								
21°28'	60°32'	5730	200	3	0.60	2.30	1.38	SP 14
24°33'	61°42'	5675	200	3	0.76	2.31	1.76	SP 15
ATLANTIS II 42[3]								
20°01'	49°46'	4650	720	5	0.24	2.44	0.58	33
20°21'	50°52'	4820	690	4	0.21	2.32	0.49	34
20°39'	51°56'	5300	250	3	0.61	2.05A	1.25	36(1)
20°39'	51°56'	5240	230	3	0.54	2.05A	1.10	36(2)
21°00'	52°56'	4680	250	3	0.23	2.24	0.51	37
21°19'	53°58'	5300	720	5	0.89	2.37	2.11	38
21°44'	55°00'	5300	710	5	0.65	2.31	1.51	39
22°14'	56°39'	5980	900	5	0.53	2.40	1.28	41
27°15'	60°37'	5640	870	5	0.50	2.21	1.12	43
29°06'	62°00'	5260	860	5	0.58	2.45	1.41	44
CHAIN 21[4]								
29°51'	54°36'	5610			0.50	2.08	1.09	1
28°56'	46°44'	4370			0.30	2.24	0.67	4
CHAIN 39[5]								
29°00'	59°11'	5811				1.96	0.95	1
25°18'	55°44'	5932				1.88	1.19	2
24°04'	55°15'	5984				1.82	0.61	3
28°30'	57°59'	5800				1.65	0.79	5
29°56'	60°33'	5715				1.84	1.32	6
29°47'	62°12'	4865				1.83	1.20	7

TABLE 2 (Continued)

NON-LAMONT DATA IN THE VICINITY OF SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow HFU	HF Station #
ZEPHYRUS EXPEDITION[6]								
20°12'	49°01'	4632			0.30	1.5	0.5	12
21°06'	46°30'	3912			0.16	1.9	0.3	13
21°56'	45°46'	3372			3.24	2.0	6.5	15
23°06'	45°39'	3983			1.48	2.0	3.0	16

P = penetration into sediment, N = number of probes in mud, A = assumed thermal conductivity

1 Reitzel, 1963
2 Von Herzen et al., 1970
3 Von Herzen and Simmons, 1972
4 Lister and Reitzel, 1964
5 Birch and Halunen, 1966
6 Nason and Lee, 1964

LAMONT DATA IN THE VICINITY OF SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow (HFU)	Evaluation	T'Grad
CONRAD 8									
24°53'	57°52'	5672			0.42	2.14	0.90	8	90
25°16'	56°48'	6235			0.78	2.20	1.72	3	91
27°47'	56°28'	5306			0.98	1.85	1.81	8	92
CONRAD 11									
23°34'	59°10'	5971			0.69	2.51	1.73	9	3
21°25'	57°38'	5300			1.20	2.48	2.98	4	4
CONRAD 15									
21°59.4'	60°21.4'	5862	1303	3	0.52	2.23	1.16	8	38
23°10.1'	60°29.4'	5880	1257	3	0.93	2.33	2.16	9	39
25°15.0'	60°25.5'	6043	1263	3	0.59	2.34	1.38	10	40
26°00.2'	60°18.9'	5853	1261	3	0.50	2.61	1.30	10	41
27°38.0'	60°25.6'	5824	1123	3	0.53	2.38	1.38	9	42
27°36.4'	60°40.1'	6405	930	2	0.73	2.32	1.69	7	43
27°25.4'	61°14.5'	5933	1215	3	0.48	2.76	1.31	10	44
28°02.5'	61°00.7'	5075	390	1	0.67	2.4A	1.62	4	45
27°39.6'	61°05.1'	5132	360	2	0.59	2.4A	1.43	6	46
27°15.3'	61°08.1'	5747	1285	3	0.29	2.43	0.69	8	47
26°59.5'	61°21.7'	6041	1273	3	0.59	2.4A	1.41	8	48
27°12.3'	60°28.5'	6102	1224	3	0.34	2.59	0.88	10	49
26°56.1'	60°46.3'	5765	1192	3	0.56	2.38	1.32	10	50
27°35.2'	60°24.7'	5633	1276	3	0.53	2.49	1.32	10	51
27°32.6'	60°25.3'	5611	1198	2	0.54	2.65	1.43	8	52
27°59.7'	60°57.9'	5467				3.34			53
28°02.3'	60°59.6'	5597				2.40			54A

TABLE 3 (Continued)

LAMONT DATA IN THE VICINITY OF SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow (HFU)	Evaluation	T'Grad
CONRAD 16									
24°19.8'	58°43.9'	6006	723	3	0.46	2.55	1.16	8	96
24°21.1'	58°43.3'	6120	1263	4	0.50	2.66	1.33	9	97
24°35.1'	58°45.6'	6001	524	2	0.68	2.58	1.75	8	98
25°47.0'	58°46.3'	6249	744	3	0.74 1-3NL	2.42	1.79	9	99
27°54.7'	59°11.7'	6348	443	2	0.80	2.42	1.94	5	100
26°51.4'	59°18.1'	6422	623	3	0.45	2.50	1.13	8	101
26°35.5'	59°50.9'	5394							102
27°24.0'	59°42.9'	5866	Manganese crust - core fell over - no data						103
27°42.9'	59°46.6'	5374	180	1	0.56	2.21	1.25	4	104
26°38.5'	59°52.2'	5866	656	2	0.88	2.32	2.04	8	105
26°34.8'	59°51.8'	5298	262	1	0.60	2.10	1.25	3	106
26°19.2'	59°30.3'	5573							107
27°04.4'	58°55.2'	5569	213	1	0.69	2.4A	1.66	3	108
27°01.9'	58°50.1'	5807	1085	3	0.56	2.40	1.35	9	109
28°40.9'	60°18.7'	5627	606	3	0.76	2.20	1.68	9	110
29°04.6'	60°53.2'	5355			Manganese Crust				111
27°56.7'	60°49.7'	6316	932	4	0.55	2.45	1.35	10	112
27°55.4'	61°16.8'	6362	1059	3	0.33	2.47	0.82	9	113
28°21.1'	62°08.6'	5554	615	2	0.78	2.09	1.63	8	114
CONRAD 17									
22°44.3'	54°12.6'	5765	1015	5	.280	2.24	0.63	9	9

LAMONT DATA IN THE VICINITY OF SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow (HFU)	Evaluation	T'Grad
VEMA 23									
22°48'	61°40'	5740				2.52			72
27°26'	61°18'	5770	1129	3	0.29	2.21	0.64	7	74
25°58'	60°19'	5874	860	3	0.50	2.35	1.18	7	75
VEMA 25									
28°44'	61°03'	5813	1074	3	0.64	1.80	1.15	8	3
28°38'	59°43'	5324	968	3	0.62	1.82	1.13	10	4
28°43'	57°33'	5902	1227	2	0.57	2.16	1.23	5	5
28°41'	53°41'	5299	686	3	0.81	1.71	1.39	10	6
27°40'	50°15'	4774	706	3	0.29	2.42	0.70	7	7
25°13'	45°02'	2497	160	2	2.86	2.36	6.75	4	25
25°16'	45°01'	2568	456	3	1.34	2.43	3.26	5	26
24°29'	48°01'	4101	386	4	0.98_{1-3}RG	2.43	2.39	10	27
24°55'	48°54'	5057	427	4	0.71_{1-3}RG	2.14	1.52	10	28
24°24'	51°02'	5417	729	4	1.29	2.04	2.63	8	29
21°30'	53°24'	5612	886	4	0.29_{1-4}NL	2.18	0.63	10	31
20°23'	53°36'	5282	873	4	0.86	2.18A	1.88	8	32
VEMA 26									
29°54'	45°07'	3244	648	2	0.13NL	2.36	0.30	5	4
29°48'	45°11'	2606			0.74_{1-3}NL	2.38			5
24°28'	62°30'	3920	815	3	0.63	2.47	1.54	8	85

TABLE 3 (Continued)

LAMONT DATA IN THE VICINITY OF SITES 3 AND 4

Latitude (N)	Longitude (W)	Depth (Corr m)	P (cm)	N	Gradient (°C/10 m)	Conductivity (mcal/°C sec cm)	Heat Flow (HFU)	Evaluation	T'Grad
VEMA 31									
26°27.5'	58°51.1'	6318	1282	5	0.61	2.22	1.35		39
26°51.9'	60°12.6	6253	1290	4	0.47	2.32	1.09	10	40
26°38.4'	61°03.0'	6146	1840	4	0.60	2.29	1.37	9	41
28°55.4'	63°27.8'	5255	1288	4	0.68	1.92	1.30		42

P = penetration into sediment, N = number of probes in mud. NL = non-linear gradient,
A = assumed conductivity, RG = reversed gradient, 0.50_{i-j} = gradient measured between probes i and j.

FIGURE CAPTIONS

Figure 1 Heat Flow Values Near Site #3. Squares represent the new values reported here. The rectangle in the lower right hand corner roughly outlines Site #3.

Figure 2 A Logarithmic Histogram of Heat Flow Values Near Site #3.

Figure 3 Profiler Records for Stations 15 - 18.

Figure 4 Heat Flow Values Near Site #4. Squares represent the new values reported here. The location of Site #4 is outlined in the lower right hand corner.

Figure 5 Profiler Records for Stations 11 - 13.

Figure 6 A Logarithmic Histogram of Heat Flow Values Near Site #4.


30°N
29°N
28°N
27°N
26°N
25°N
24°N
57°W
58°W
59°W
60°W
61°W
62°W
63°W
64°W
65°W
other data
conductivity

Figure 1

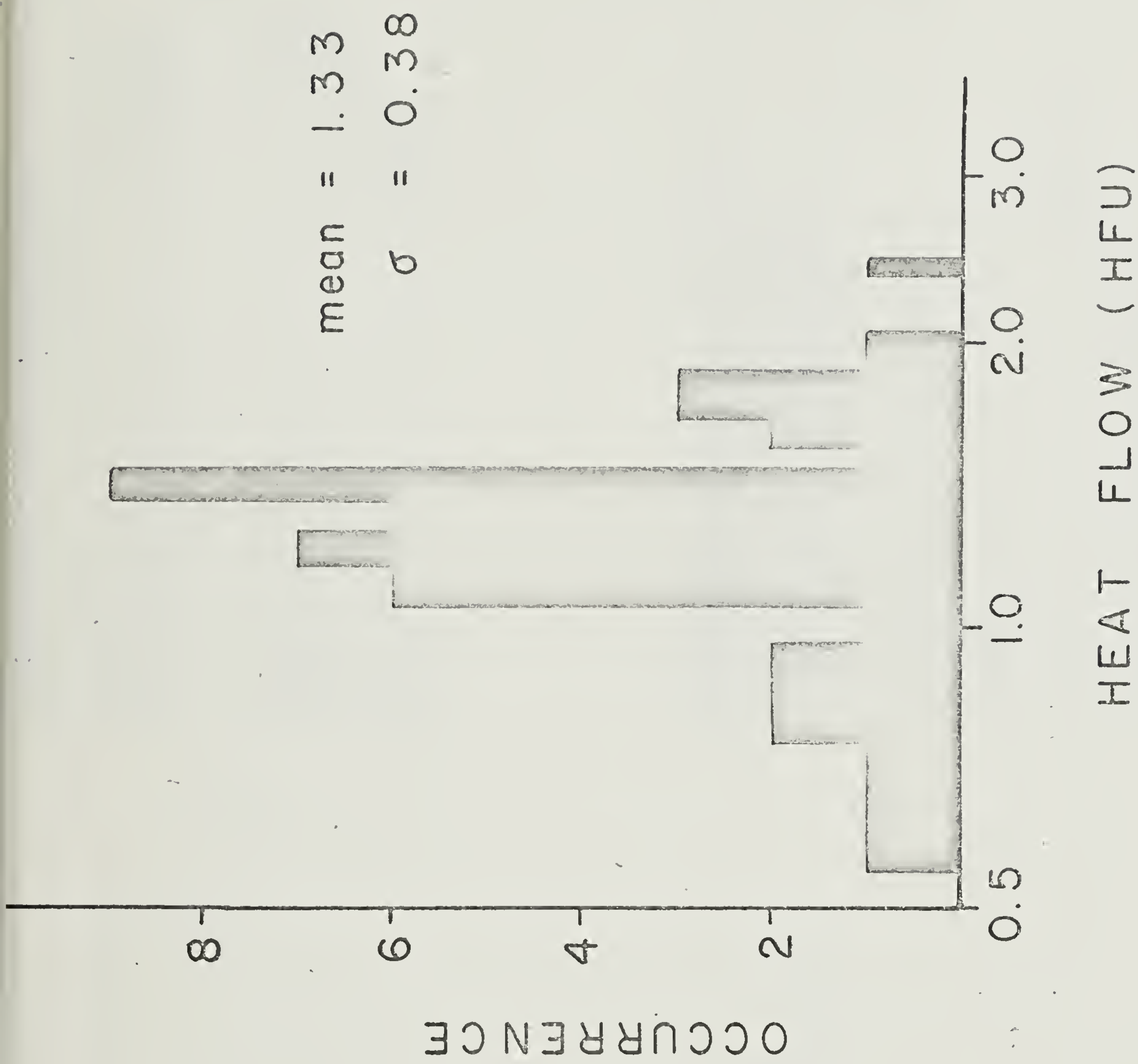
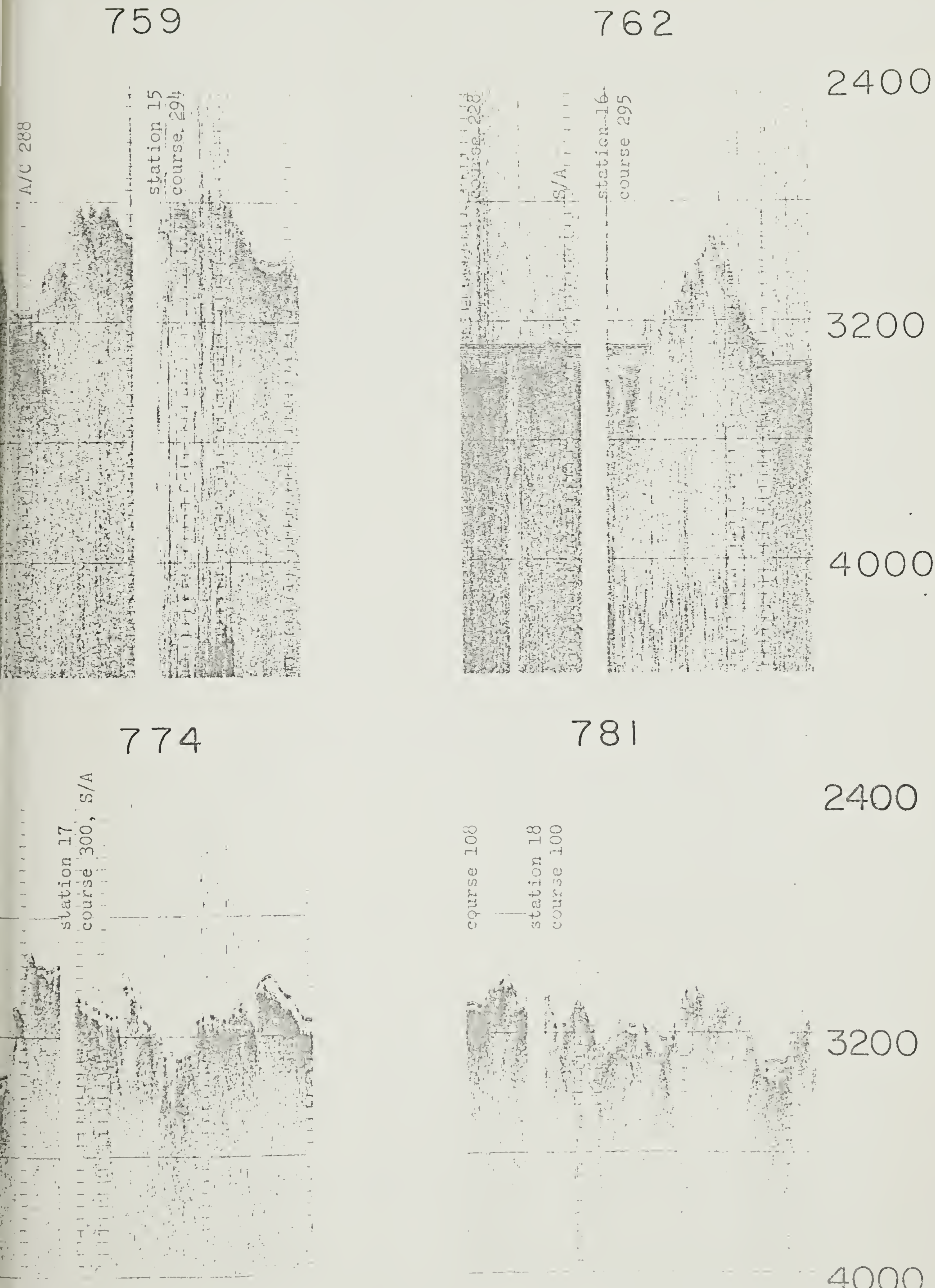


Figure 2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course 300, S/A
course 108
station 18
course 100

Figure 3

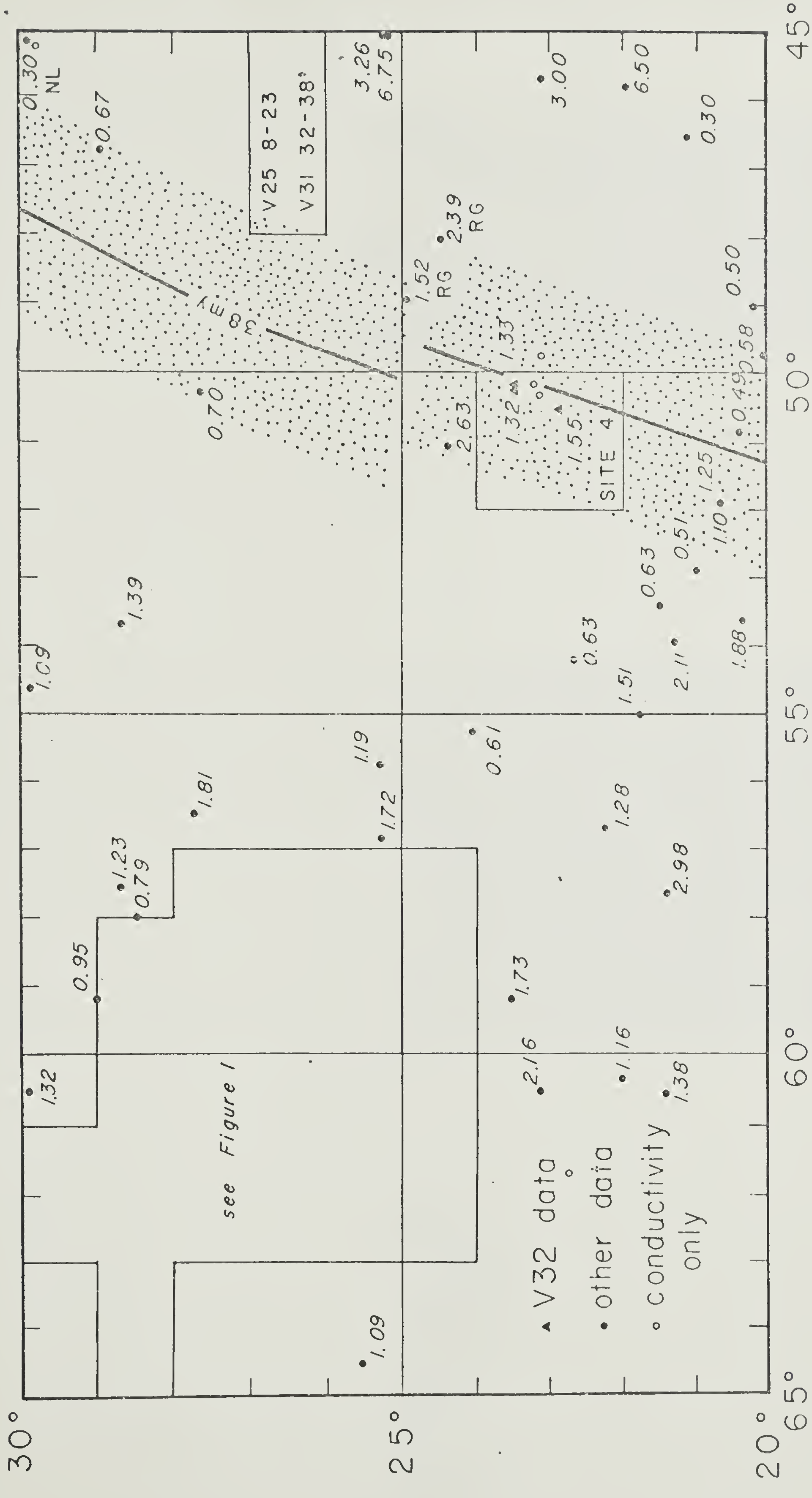
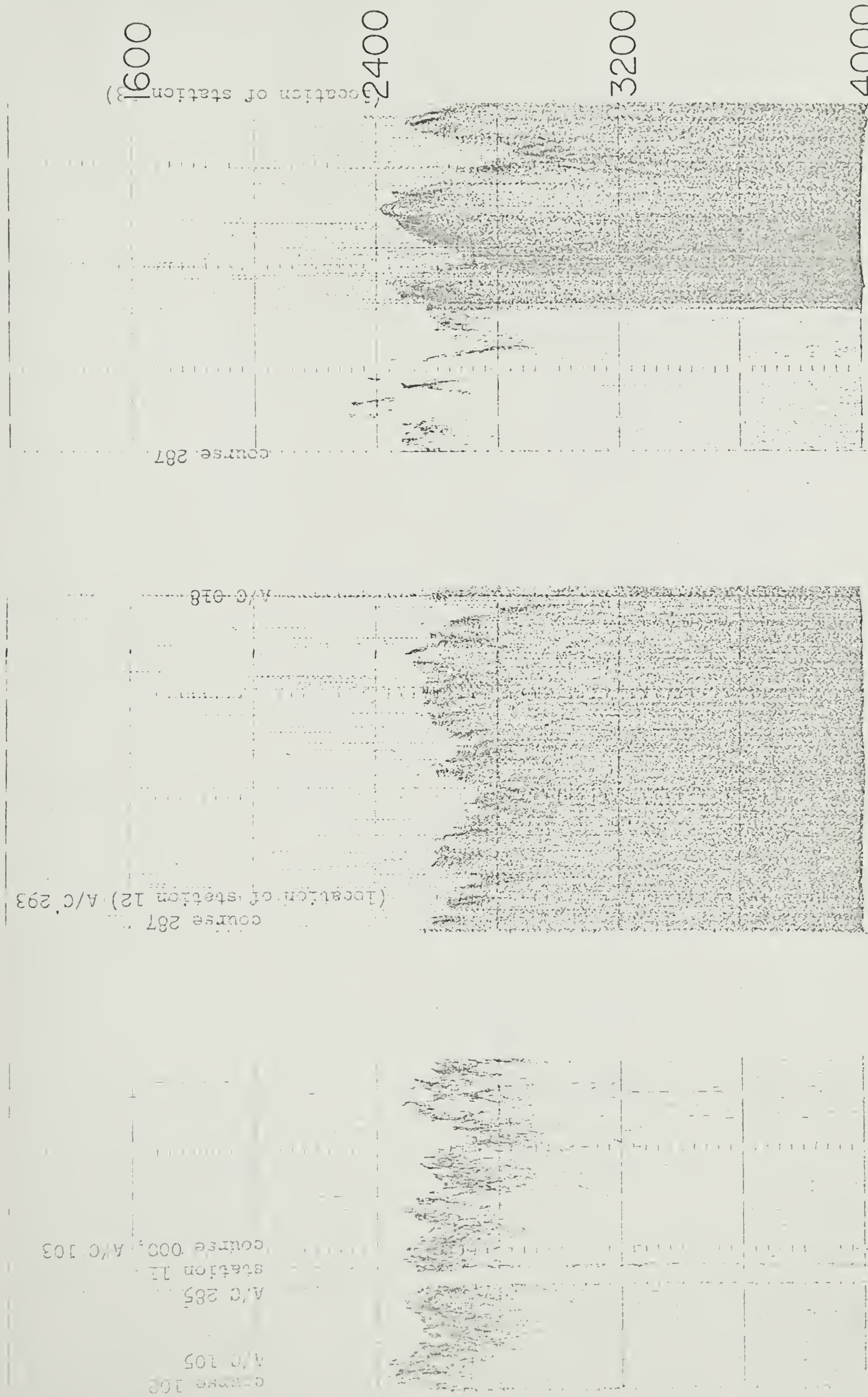

V25 8-23
V31 32-38'
SITE 4
see Figure 1
V32 data
other data
conductivity only
NL
RG
30°
25°
20°
45°
50°
55°
60°
65°

Figure 4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3200
4000
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course 287
course 000, A/C 103
station 11
A/C 285
A/C 105

Figure 5

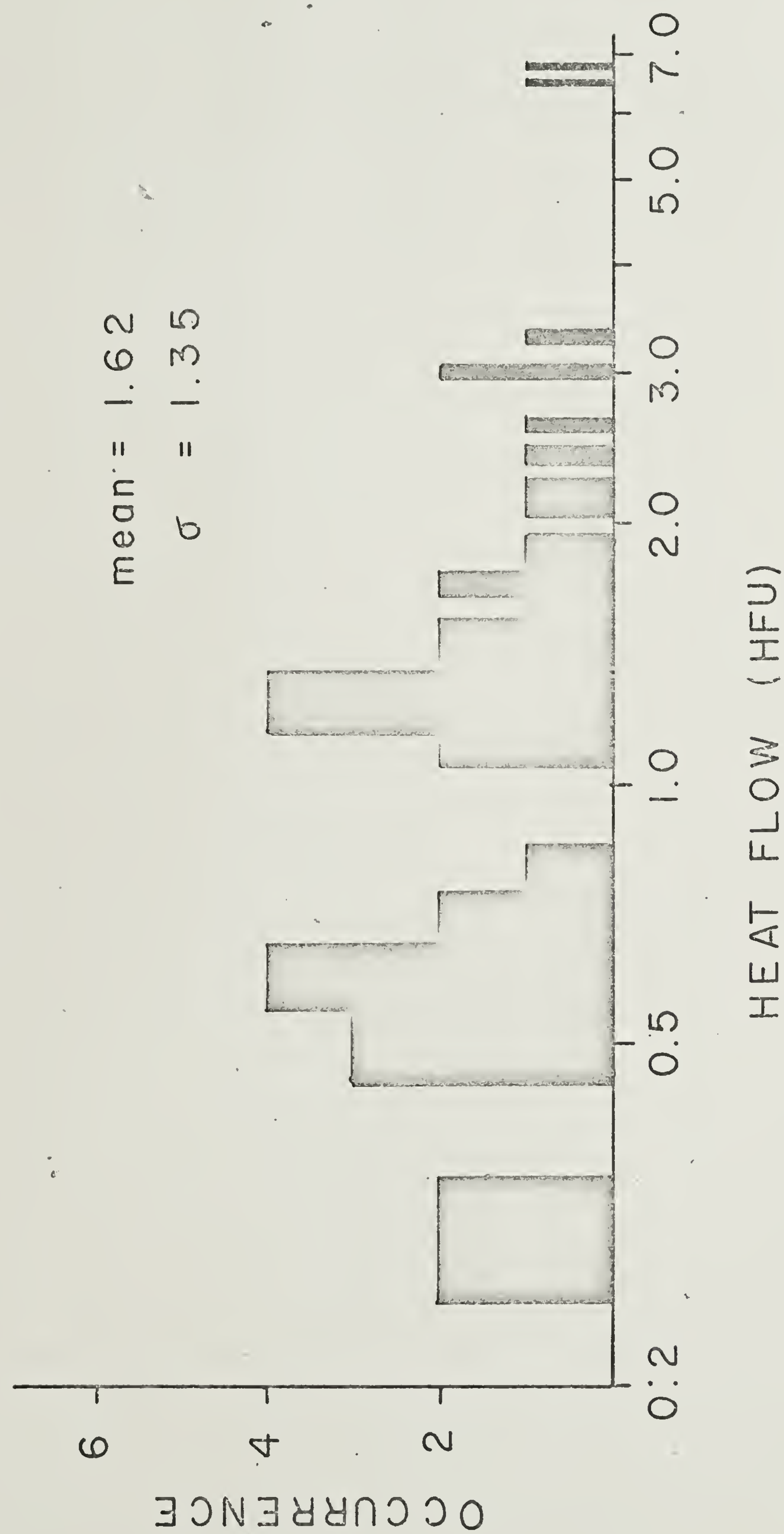

Figure 6